9400 Holly Avenue NE | Bldg 3, Suite 300 | Albuquerque, NM 87122 | P (505) 266-6611 | F (505) 266-7738
trinityconsultants.com

Trinity Consultants

November 3, 2016

Mr. Isreal Tavarez
Environmental Health Manager
Air Quality Program (AQP)
Environmental Health Department
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

Re: ATC Permit #217-M5 Modification Application for CTS Electronic Components, Inc.
Trinity Project #163201.0105

Dear Mr. Tavarez,

CTS Electronic Components, Inc. (CTS) respectfully submits the enclosed air quality permit application package to modify its existing air quality Authority-to-Construct (ATC) Permit #217-M5 issued on 1/24/2000. The modification is occurring primarily due to CTS's desire to reduce its already low process emissions with new high efficiency control equipment. We are also proposing to change the permit from a batch limit basis to the more common mass emissions permit limit basis given the product variation flexibility that CTS needs to remain competitive in the global high-tech electrical parts market.

As soon as the AQP gives approval, CTS would like to install the large new 99.97% efficient HEPA dust collector, emission unit (EU) #40, also known as "DC-4". DC-4, as a new controlled emission unit, will consolidate multiple existing process exhaust units through its higher control efficiency HEPA-rated dust collector system. The proposed consolidations of process exhaust units into DC-4 and other controlled emission units will substantially further reduce CTS's low particulate matter and lead process emissions at their high-tech piezoelectric components manufacturing plant located at 4800 Alameda Blvd. NE, Albuquerque, NM 87113.

CTS's manufacturing plant in Albuquerque provides quality jobs for about 242 local employees who make ceramic electronic components. Components include Radio Frequency (RF) filters, Electromagnetic Components (EMC) and Piezoelectric Products (PEP). The principal composition of RF and EMC ceramics are barium and titanium. Principal components of PEP products are lead, zirconate, and titanate, abbreviated as PZT (plumbum, zirconate, titanate). RF filters are used for wireless communications. EMC components are used as an electromagnetic frequency filter. PEP components are used to convert sound waves or vibration energy into an electrical signal or vice versa. CTS ceramic electronic components are used in sonar, smart phones, cellular communication, medical ultra-sound and sonogram equipment.

The manufacturing process for all 3 types of ceramic electronic components is similar. Metal oxides or other metal compounds are weighed out, blended, milled, calcined, spray dried, pressed into a shape, then fired at high temperature to convert to a ceramic material. Subsequent finishing operations are product specific and may involve shaping and or applied metallic coatings. Important aspects of health care, cellular communications and national security all rely heavily on ceramic electronic components.

PENDING EMISSIONS CONTROLS AND STACKS

The enclosed permit modification application package represents CTS's proposed plans to further control process emissions. The plans will be implemented by CTS either:

1. Following AQP authorization; or,
2. After issuance of the modified air permit.

If possible, before issuance of the modified permit, please let us know if/when CTS is free to install the new large green Farr HEPA dust collector, DC-4, that you and your AQP colleagues observed during your plant visit in February 2016.

Due to the proposed increased controls, **the enclosed permit modification application proposes reductions in all criteria and regulated air pollutants from the levels in CTS's existing ATC Permit #217-M5** except for the already very low levels sulfur dioxide from natural gas combustion. The application includes supporting emission calculations and air dispersion modeling for the proposed setup in which process emissions are routed to new high efficiency dust collectors. The existing CTS ATC Permit #217-M5 currently lists three existing dust collectors (DC) as emission units (EUs) #1, #2 and #3 and in this modification application they are identified using CTS's abbreviations as DC-1, DC-2 and DC-3. DC-1 and DC-2 have constantly remained in service to control Pb and non-Pb particulate matter (PM) process emissions. DC-3 was decommissioned when Motorola's former operations ceased at 4700 Alameda NE to the west.

This application anticipates the following new and existing <u>controlled emissions units filtering at high efficiencies the following **combined** process exhaust (Combo Stack) emission units</u>:

A. New **DC-4** (EU #40) replacing existing DC-1 (EU #1) to better handle the flow of primarily Pb-containing process emissions at a higher 99.97% HEPA control efficiency (of particles 0.3 microns or larger);

B. Existing **DC-3** (EU #3) returning to service to better filter the flow of uncontrolled primarily non-Pb minor PM process emissions with an approximate 95% efficiency;

C. Existing **DC-2** (EU #2) remaining in service to continue to filter the flow of primarily non-Pb process emissions with an approximate 95% efficiency;

D. New Filtered Exhaust Unit **FEU-1** (EU #39) primarily to replace UF-16/Il1, etc., to better filter the flow of primarily Pb-containing process emissions with an approximate 99.99% ultra-efficiency;

E. Existing **UF-1** (EU #8) remaining in service to continue to filter the flow of primarily Pb-containing process emissions with an approximate 95.95% efficiency. ; and,

F. Existing **UF-3** (EU #10) remaining in service to continue to filter the flow of primarily Pb-containing process emissions with an approximate 95.95% efficiency.

The application also proposes continued operation of the following <u>controlled **individual** emission unit</u>:

G. Existing **UF-2** (EU #9) remaining in service to continue to filter the flow of primarily Pb-containing process emissions with an approximate 95.95% efficiency.

The eventual goal is that all significant Pb-containing process emissions are controlled through one of the seven A. through G. high-efficiency dust filtration systems above. All these control systems are or will be fitted with pressure gauges to indicate pressure drop across the filters which will be either automatically monitored on the newer systems, or manually checked and recorded on at least a daily basis on the older systems. The monitored gauges will ensure continued high efficiency control of Pb and total suspended particulate (TSP) and other PM emissions.

The only other process-related stack in the proposed future plan at CTS is the existing uncontrolled *Facility Fume Hood Ventilation (a.k.a., Main Solvent Exhaust)* stack, **N-1,** permitted as EU #7**.** N-1 will remain in service to continue to exhaust primarily dilute concentrations of volatile organic compounds (VOCs).

Therefore, there will be only eight (8) process-related emissions stacks emitting any significant amounts of regulated pollutants at CTS in the future after the permit modification is issued. The emission calculations in the application assume all process emission units may operate up to 8,760 hours per year at full capacity.

INTERNAL ENGINEERING TESTING

On 2/19/16, you along with other AQP Permitting staff kindly visited CTS's Albuquerque plant. At the end of that visit, we appreciated your mentioning that CTS could perform some internal engineering testing on air emissions to get a better handle on actual emissions. We have since done that for TSP and Pb on some of the existing process emission exhausts/stacks with the assistance of Chris Spencer and other stack testing experts from Compliance Services & Testing (CST).

The TSP and lead (Pb) results as well as one silver (Ag) results from the internal engineering tests were all very low and well below existing CTS air permit limits. All these tests were performed while CTS operated related manufacturing processes at full capacity to reflect worst-case emission results. We used the TSP and Pb engineering test data with safety factors as the basis for much of the process equipment emissions in the permit modification application. We assumed similarities between the process emission sources that underwent internal engineering testing to the process emission sources that were not tested and added safety factors to try to conservatively over-estimate the emission levels requested in the application.

The safety factors that increase emissions are intended to accommodate potential contingencies on emission sources that were not engineering tested so as to provide a reasonable buffer to accommodate future emissions testing. The safety factors and other environmentally-protective emissions assumptions provide CTS with operational flexibility and some ability to grow. The existing ATC #217-M5 air permit was issued over 16 years ago in 2000, and our proposed changes substantially decrease nearly all allowable emissions.

NON-PROCESS HEATING EMISSIONS

Aside from the two natural gas-fired process spray dryers owned by CTS, the combustion equipment controlled by CTS and/or shared with Central New Mexico Community College (CNM), including the 3 boilers, are all non-process related used for comfort heating. Therefore, only the combustion criteria pollutants from the process Spray Dryers SD-1 and SD-3 needed to be modeled. For the natural gas combustion emissions from process and non-process equipment, we used the applicable EPA AP-42 emission factors and *GRI HAPCalc* software for calculating the hazardous air pollutants (HAPs).

To conservatively over-estimate emissions in the calculations, we assumed that CTS-controlled EU #11a boiler runs at capacity 8,760 hours per year as a comfort heating emissions unit that likely actually operates the

equivalent of less than half a year. For the two boilers shared with CNM, EUs #11b & #11c, we assumed that half of 8,760 hours per year, or 4,380 hours per year would be applied to CTS which is also conservatively over-stating on emission calculations for these comfort heating emissions units. Emissions from such non-process equipment are not required to be modeled for air dispersion, so no modeling was conducted on them.

MODIFICATION VS EXISTING ATC PERMIT #217-M5

Even with the safety factors and other conservative emissions over-stating assumptions built in, the enclosed permit modification application proposes reductions from 39% to 99% in all criteria air pollutants, except sulfur dioxide, from the levels CTS is allowed in their existing ATC Permit #217-M5. The proposed low sulfur dioxide emissions are from natural-gas fired emission units. The proposed small sulfur dioxide increase is less than one half ton per year, which itself is low enough to qualify for a technical revision instead of a permit modification. We suspect that the emission factors for sulfur dioxide calculation methodology used in the era of the existing 1/24/2000 issued ATC Permit #217-M5 and prior applications are different than what is commonly used now to more conservatively calculate sulfur dioxide emissions from natural gas combustion.

Most notably, CTS's proposed future controlled lead (Pb) emissions in this application are only 0.00018 pounds per hour (lbs/hr), which is **a 99.8% reduction in Pb** from 0.15 lbs/hr in the existing ATC Permit #217-M5. Similarly, the 0.00078 tons per year (tpy) of Pb in this application is a 99.8% reduction in Pb from 0.37 tpy in ATC Permit #217-M5. There are double-digit reductions in all the other criteria air pollutants in this application except for sulfur dioxide as discussed above. Most of the process emissions reduction is due to routing nearly all process emissions through high efficiency dust collectors, but most of the non-process emissions reduction is due to decommissioning or the change in ownership to CNM of the non-process related emission units in the existing ATC Permit #217-M5 as discussed below.

CNM is now the owner of all the boilers in the 4700 and 4800 Alameda NE buildings. CNM also has exclusive operational control of boiler EUs #11d through #11f in ATC Permit #217-M5. Therefore, those three CNM boiler EUs are not included in this permit modification application. CNM and CTS share operations of boiler EUs #11b and #11c, so CTS has only applied for half a year or 4,380 hours per year of emissions in this application. The only boiler that CTS has exclusive operational control of is EU #11a, which at 7.1 MMBtu/hr of natural gas heat input is the largest of the boilers at the site. All the boilers and miscellaneous smaller natural gas-fired heaters and water heaters on-site are all for comfort heating and are not process equipment.

Also, EUs #1, #12, #13, #14, #15, #16, and #17 in CTS's existing ATC Permit #217-M5 are decommissioned in this application as follows:

- EU #1 – Dust Collector #1 is to be replaced by the new and more efficient EU #40 HEPA-rated DC-4 Dust Collector.
- EU #12 - General Building Exhaust, no longer an emissions source since the various process exhaust units, including hoods, N-1, etc., all capture pollutants inside the building and serve to maintain healthy indoor air quality for all of CTS's employees.
- EU #13 – Midsaws Exhaust, aka, UF-16 or Il1, to be re-routed into FEU-1 for ultra-filtration.
- EU #14 - UF10 centerless grinding be re-routed into FEU-1 for ultra-filtration. Related wet grinding processes may not have significant emissions needing exhaust;
- EU #15 – Clean Room Exhaust, aka, UF-18, to be re-routed into DC-3 for high efficiency filtration.
- EU #16 – emergency generator is disconnected and no longer needed; and,
- EU #17 - fire pump is disconnected and no longer needed.

CTS's N-1 Main Solvent Stack and fugitive (e.g., chemical storage shed) chemical-related VOC and HAPs emissions in the application have been calculated based on the average of CTS's 2014 & 2015 annual air emission inventories (AEIs) and recent chemical purchasing/inventory records. It should be noted that most of CTS purchased organic solvents are actually not emitted to the atmosphere, but leave the facility as liquid hazardous wastes that are recycled or properly disposed. Trinity has used CTS's average AEI and recent purchasing VOC & HAPs chemical quantities along with safety factors to arrive at the proposed N-1 and fugitive emissions that in total are still substantially below the VOCs emissions allowed in CTS's existing ATC Permit #217-M5. CTS's excellent chemical purchasing and disposal record-keeping along with MSDS/SDS information were used to calculate their VOC and HAP chemical emissions in the AEIs. No HAPs comparison can be made between this modification application and the existing ATC Permit #217-M5 since no HAPs emissions (aside from perhaps Pb compounds) are mentioned in CTS's existing ATC Permit #217-M5.

Similar to how the AQP has recently issued permits to other local high-tech manufacturing facilities that use and carefully track chemical quantities purchased and disposed, AQP could similarly establish a chemical (CHEM) purchasing & disposal tracking enforceable basis for the VOCs and HAPs in CTS's modified permit. The CHEM approach should be equally if not more protective of air quality than other onerous approaches that could limit operational flexibility that is also important for CTS to remain competitive in the global electronics market.

SITE HISTORY AND OWNERSHIP

The building in which CTS operates at 4800 Alameda NE was originally part of a Motorola plant that also manufactured electronic components including ceramic electronics. The Motorola plant also incorporated the 4700 Alameda NE building immediately to the west of CTS that is now CNM's *Advanced Technology Center* instructional facility for aircraft mechanics, etc. CNM is now the landlord and owner of the land and both buildings including where CTS is located. CNM is the primary occupant of a portion of the south half of the CTS building. CTS has manufacturing operations in the north half of the 4800 Alameda NE CTS building.

As mentioned above, some of the EUs in CTS's existing ATC Permit #217-M5 are relics from past facility owners that were decommissioned years ago, and some are now owned and operated by CNM so they are not carried forward in this CTS permit modification application. CNM is technically the owner of all the boilers in both buildings, but CTS has operational control of boiler EU #11a, and CNM and CTS share operations of boiler EUs #11b and #11c.

MODELING

Trinity performed air dispersion modeling on CTS's controlled future process emissions using Breeze ™ AERMOD software. Trinity initially consulted with AQP head modeler, Jeff Stonesifer, on the modeling protocol before writing it. The modeling protocol was submitted to him prior to the application. Given the AQP's subsequent modeling and related requests from Mr. Stonesifer in mid-September, Trinity later refined the modeling as requested. This included replacing the normal Sunport Airport met data with closer met data that matched the windrose from AQP's closest monitoring station at 2nd Street and Alameda Boulevard. The modeling protocol and the modeling report are presented in the Modeling section at the back of this application package.

In summary, CTS's proposed controlled emissions are so low that the worst-case modeling results were even below significant impact levels (SILs) for all pollutants except for particulate matter (PM). Relative to EPA's public health protection-based National Ambient Air Quality Standards (NAAQS) for PM, CTS's worst-case future controlled 2.5 microns or smaller PM (PM2.5) are only 72.1% of the 24-hour standard and 86.8% of the annual standard.

The worst-case future lead (Pb) exposures are modeled at only 3.2% of the SIL and a tiny fraction less than 0.70% of the public health protection-based primarily NMAAQS/NAAQS for Pb. Therefore, CTS's emissions and environmental impacts will be both quite safe for the public and greatly reduced in the plans proposed in this air permit modification application.

TAPS EVALUATION

In reviewing Trinity's CTS Modeling Protocol, Jeff Stonesifer also requested an investigation of CTS's Toxic Air Pollutants (TAPs, a.k.a., "State Toxics") air emissions per his 9/15/16 email to Trinity. To accommodate this request, CTS and Trinity reviewed the 20.2.72.502 NMAC lists of TAPs that are applicable in most counties in New Mexico. CTS then provided Trinity with a list of the TAPs chemicals that are used in the Albuquerque plant along with estimates of the annual quantities purchased or in storage on-site.

Using CTS's TAPs list and quantities, chemical manufacturers data (e.g., SDS forms), and the vapor pressures of the volatile liquid TAPs, Trinity computed the estimated annual evaporative losses of TAP volatiles and/or decomposition products to the atmosphere. Based on the relative vapor pressures of the TAPs liquids, annual evaporation rates ranging from 1% (for non-volatile sulfuric acid) to 100% (for highly volatile hydrogen peroxide and nitric acid) were used to estimate liquid TAPs emissions to the atmosphere. The TAPs evaluation calculations are presented in the Calculations section of the application.

All the solid TAPs chemicals were assumed to have 5% losses to the atmosphere. Solids losses of 5% conservatively over-state CTS's emissions since all TAPs usage occurs inside the plant which uses wet methods for all cutting and polishing operations that are vented to atmosphere. Furthermore, process emissions involving TAPs will be exhausted through dust collector filters with high efficiencies ranging from 95% to 99.99% for particles down to 0.3 microns.

All of CTS's TAPs emissions from liquids or solids were calculated well below the pound per hour (lb/hr) emission threshold levels listed in Tables A or B of 20.2.72.502 NMAC, except for the 30% hydrogen peroxide solution that is mostly used for wastewater treatment. We estimated CTS's hypothetical hydrogen peroxide emissions at 0.37 lb/hr while the Table A 20.2.72.502 NMAC emissions threshold for modeling is 0.10 lb/hr. However, we mention hydrogen peroxide air emissions as hypothetical since most of that chemical is discharged in wastewater and what evaporates is relatively unstable and readily decomposes in the air/sunlight at the temperatures used at CTS. Under conditions at CTS, hydrogen peroxide vapor decomposes into the benign oxygen gas and water vapor. The well-understood chemistry of hydrogen peroxide decomposition is as follows:

$$2\ H_2O_2 \rightarrow 2\ H_2O + O_2$$

There is no benefit in modeling the hydrogen peroxide-based emissions of oxygen and water vapor in the atmosphere as if they were air pollutants. Therefore no air dispersion modeling of CTS's TAPs emissions should be required since no TAP concentrations above the Table A or Table B of 20.2.72.502 NMAC modeling thresholds would occur at the CTS facility fence-line.

PUBLIC NOTICE

We have performed the 20.11.41 NMAC required pre-application public notice. Using the list of registered neighborhood association (NA) and coalition representatives that AQP provided, we have emailed the enclosed public notice NOI form to all the NA and coalitions representatives within a ½ mile radius of CTS.

We understand that the AQP will also be publishing a separate public notice in local newspapers after the AQP deems the permit modification application complete.

We are ready to assist with any explanations of CTS's efforts to further reduce actual air emissions during the public notice process. We hope that AQP can expeditiously issue the permit modification that will allow CTS to further improve air quality and our environment in Albuquerque.

CONCLUSION AND MOVING FORWARD

The proposed reductions of TSP/PM, lead, and nearly all other criteria or regulated pollutants emissions from CTS is substantial in this permit modification application. Only sulfur dioxide is proposed to slightly increase less than half of a ton per year as compared to CTS's existing permit #217-M5.

The enclosed 2016 air quality ATC Permit 217-M5 modification application package includes all the pre-permit forms and associated pre-application public notice attachments. This permit modification application package is submitted with a CTS check for $1,632.00 payable to "City of Albuquerque Fund 242" to cover AQD's 2016 review fees.

CTS respectfully requests AQP's permission to install the large new DC-4 Camfil Farr HEPA dust collector and other dust collectors as soon as possible. Please let us know if/when that might be possible so CTS can begin the related design and construction arrangements.

We believe this application provides the AQP with all the information necessary to review and approve the proposed modifications. However, if additional information is needed, or if you have any related questions or suggestions, please contact me at VHershberger@trinityconsultants.com or by phone at (505) 266-6611.

Thank you for your assistance,

TRINITY CONSULTANTS

Vernon Hershberger

Vernon Hershberger, CHMM, LEED AP
Sr. Consultant

Cc: John Wakefield, Environmental, Health and Safety Engineer, CTS Electronic Components, Inc.
George Lytwynyshyn, Corporate Health and Safety Director, CTS Corporation

Trinity Project #163201.0105

Enclosure - CTS Air Permit Modification Application Package

APPLICATION TO MODIFY AIR PERMIT #217-M5

CTS Electronic Components, Inc.

Albuquerque Ceramic Electronics Manufacturing Facility

Prepared By:
Vernon Hershberger, CHMM, LEED AP, Senior Consultant

TRINITY CONSULTANTS
9400 Holly NE Blvd.
Building 3 Suite 300
Albuquerque, NM 87122
P: (505) 266-6611
F: (505) 266-7738

November 2016
Trinity Project #: 163201.0105

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City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Checklist

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. Prior to ruling a submitted application complete each application submitted shall contain the required items listed below. **This checklist must be returned with the application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

All applicants shall:

1. ☑ Fill out and submit the *Pre-permit Application Meeting Request* form
   a. ☑ Attach a copy to this application

2. ☑ Attend the pre-permit application meeting
   a. ☑ Attach a copy of the completed *Pre-permit Application Meeting Checklist* to this application

3. ☑ Provide public notice to the appropriate parties
   a. ☑ Attach a copy of the completed *Notice of Intent to Construct* form to this form
   Neighborhood Association(s):
   i. *Alameda North Valley*
   ii. *North Edith Corridor*
   iii. *Wildflower Area*

   Coalition(s):
   iv. *North Valley Coalition*
   v. *Coalition of Neighborhood Association, District 4*

   b. ☑ Attach a copy of the completed *Public Sign Notice Guideline* form

4. Fill out and submit the *Permit Application*. All applications shall:

   A. ☑ be made on a form provided by the Department. Additional text, tables, calculations or clarifying information may also be attached to the form.

   B. ☑ at the time of application, include documentary proof that all applicable permit application review fees have been paid as required by 20 NMAC 11.02. Please refer to the attached permit application worksheet.
   CTS check for $1,632 payable to City of Albuquerque Fund 242" for ATC review fee submitted.

C. ☑ contain the applicant's name, address, and the names and addresses of all other owners or operators of the emission sources.

D. ☑ contain the name, address, and phone number of a person to contact regarding questions about the facility.

E. ☑ indicate the date the application was completed and submitted

F. ☑ contain the company name, which identifies this particular site.

G. ☑ contain a written description of the facility and/or modification including all operations affecting air emissions.

H. ☑ contain the maximum and standard operating schedules for the source after completion of construction or modification in terms of hours per day, days per week, and weeks per year.

I. ☑ provide sufficient information to describe the quantities and nature of any regulated air contaminant (including any amount of a hazardous air pollutant) that the source will emit during:

- Normal operation
- Maximum operation
- Abnormal emissions from malfunction, start-up and shutdown

J. ☑ include anticipated operational needs to allow for reasonable operational scenarios to avoid delays from needing additional permitting in the future.

K. ☑ contain a map, such as a 7.5-minute USGS topographic quadrangle, showing the exact location of the source; and include physical address of the proposed source.

L. ☑ contain an aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation, or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the department in writing.

M. ☑ contain the UTM zone and UTM coordinates.
From Google Earth

N. ☑ include the four digit Standard Industrialized Code (SIC) and the North American Industrial Classification System (NAICS).

O. ☑ contain the types and **potential emission rate** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

P. ☑ contain the types and **controlled** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

Q. ☑ contain the basis or source for each emission rate (include the manufacturer's specification sheets, AP-42 Section sheets, test data, or other data when used as the source).

R. ☑ contain all calculations used to estimate **potential emission rate** and **controlled** emissions.

S. ☑ contain the basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design drawings, test reports, and factors which affect the normal operation (e.g. limits to normal operation).

T. ☑ contain fuel data for each existing and/or proposed piece of fuel burning equipment.
Only pipeline quality natural gas.

U. ☑ contain the anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.

V. ☑ contain the stack and exhaust gas parameters for all existing and proposed emission stacks.

W. ☑ provide an ambient impact analysis using a atmospheric dispersion model approved by the US Environmental Protection Agency (EPA), and the Department to demonstrate compliance with the ambient air quality standards for the City of Albuquerque and Bernalillo County (See 20.11.01 NMAC). If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.

X. ☑ contain a preliminary operational plan defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown.
Process emissions units will not operate unless high efficiency dust control systems are operational. The new high efficiency dust control systems will have automated monitoring of pressure drops across the filters and will auto-shutdown the system if problem detected The pressure drops gauges across the filters on the older existing new high efficiency dust control systems will continue to be monitored on at least a daily basis to prevent excess emissions from SSM events.

Y. ☑ contain a process flow sheet, including a material balance, of all components of the facility that would be involved in routine operations. Indicate all emission points, including fugitive points.

Process flow diagrams are provided for the DC-4, DC-3 and FEU-1 dust collectors that filter process emission flows from the combination of multiple exhaust systems ducts. All eight of the pending future process emission stacks and 3 natural gas fired boilers that CTS some level of ownership on are indicated on an attached aerial photo of the CTS plant roof in the Support Information section of the application package.

Z. ☑ contain a full description, including all calculations and the basis for all control efficiencies presented, of the equipment to be used for air pollution control. This shall include a process flow sheet or, if the Department so requires, layout and assembly drawings, design plans, test reports and factors which affect the normal equipment operation, including control and/or process equipment operating limitations.

AA. ☑ contain description of the equipment or methods proposed by the applicant to be used for emission measurement.
As was done by CST during the internal engineering stack testing on some of the process emissions exhausts, qualified stack testing contractors will again be hired by CTS to use the appropriate pollutant specific 40 CFR Subpart 60 EPA Methods that the AQP will require in the modified permit.

BB. ☑ be signed under oath or affirmation by a corporate officer, authorized to bind the company into legal agreements, certifying to the best of his or her knowledge the truth of all information submitted.

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

All source registration, authority-to-construct, and operating permit applications for stationary or portable sources shall be charged an application review fee according to the fee schedule in 20.11.2 NMAC. These filing fees are required for both new construction, reconstruction, and permit modifications applications. Qualified small businesses as defined in 20.11.2 NMAC may be eligible to pay one-half of the application review fees and 100% of all applicable federal program review fees.

Please fill out the permit application review fee checklist and submit with a check or money order payable to the "City of Albuquerque Fund 242" and either:

1. be delivered in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023 or Suite 3027, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,

2. mailed to Attn: Air Quality Program, Albuquerque Environmental Health Department, P.O. Box 1293, Albuquerque, NM 87103.

The department will provide a receipt of payment to the applicant. The person delivering or filing a submittal shall attach a copy of the receipt of payment to the submittal as proof of payment Application review fees shall not be refunded without the written approval of the manager. If a refund is requested, a reasonable professional service fee to cover the costs of staff time involved in processing such requests shall be assessed. Please refer to 20.11.2 NMAC (effective January 10, 2011) for more detail concerning the "Fees" regulation as this checklist does not relieve the applicant from any applicable requirement of the regulation.

City of Albuquerque

Environmental Health Department
Air Quality Program
Permit Application Review Fee Checklist

Please completely fill out the information in each section. Incompleteness of this checklist may result in the Albuquerque Environmental Health Department not accepting the application review fees. If you should have any questions concerning this checklist, please call 768-1972.

I. COMPANY INFORMATION:

Company Name	CTS Electronic Components, Inc.	
Company Address	4800 Alameda Blvd. NE, Albuquerque, NM 87113	
Facility Name	CTS Electronic Components, Inc.	
Facility Address	4800 Alameda Blvd. NE, Albuquerque, NM 87113	
Contact Person	John Wakefield, Environmental, Health & Safety Engineer	
Contact Person Phone Number	(505) 348-4252	
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?	√ **Yes**	No
If yes, what is the permit number associated with this modification?	**Permit # 217-M5**	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)	Yes	√ No

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

If the application is for a new stationary source facility, please check all that apply. If this application is for a modification to an existing permit please see Section III.

Check All That Apply	Stationary Sources	Review Fee	Program Element
Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)			
	Source Registration required by 20.11.40 NMAC	$ 544.00	2401
	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,088.00	2301
√	*Not Applicable*	*See Sections Below*	
Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 816.00	2302
	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,632.00	2303
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,265.00	2304
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 4,897.00	2305
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,530.00	2306
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$8,162.00	2307
√	*Not Applicable*	*See Section Above*	
Federal Program Review Fees (In addition to the Stationary Source Application Review Fees above)			
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,088.00	2308
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,088.00	2309
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,088.00	2310
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 10,883.00	2311
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,442.00	2312
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,442.00	2313
√	*Not Applicable*	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

If the permit application is for a modification to an existing permit, please check all that apply. If this application is for a new stationary source facility, please see Section II.

Check All That Apply	Modifications	Review Fee	Program Element
Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)			
	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,088.00	2321
√	*Not Applicable*	*See Sections Below*	
Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 816.00	2322
√	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,632.00	2323
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,265.00	2324
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 4,897.00	2325
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,530.00	2326
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$8,162.00	2327
	Not Applicable	*See Section Above*	
Major Modifications Review Fees (In addition to the Modification Application Review Fees above)			
	20.11.60 NMAC, Permitting in Non-Attainment Areas	$ 5,442.00	2333
	20.11.61 NMAC, Prevention of Significant Deterioration	$ 5,442.00	2334
√	*Not Applicable*	*Not Applicable*	
Federal Program Review Fees (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)			
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,088.00	2328
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,088.00	2329
	140 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,088.00	2330
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 10,883.00	2331
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,442.00	2332
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,442.00	2333
√	*Not Applicable*	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
	Administrative Revisions	$ 250.00	2340
	Technical Revisions	$ 500.00	2341
√	*Not Applicable*	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
	No New Air Dispersion Modeling Required	$ 500.00	2501
	New Air Dispersion Modeling Required	$ 750.00	2502
√	*Not Applicable*	*See Sections II, III or V*	

VI. Please submit a check or money order in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$ 0.00
Section III Total	$ 1,632.00
Section IV Total	$ 0.00
Section V Total	$ 0.00
Total Application Review Fee	**$ 1,632.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this_____ day of ___November_____ 2016___

Fred Baum
Print Name

Acting Plant Manager
Print Title

_____
Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:
"Qualified small business" means a business that meets all of the following requirements:

(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.

Albuquerque Environmental Health Department - Air Quality Program
Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103**
or hand deliver between 8:00am - 5:00pm Monday - Friday to:
3rd Floor, Suite 3023 - One Civic Plaza NW, Albuquerque, New Mexico 87103
(505) 768 – 1972 aqd@cabq.gov (505) 768 - 1977 (Fax)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Clearly handwrite or type **Corporate Information** **Submittal Date: __/____/_16**

1. Company Name CTS Electronic Components, Inc.
2. Street Address 2375 Cabot Drive _____ Zip 60532
3. Company City Lisle 4. Company State IL 5. Company Phone (630) 577-8879 6. Company Fax (630) 295-6601
7. Company Mailing Address: 2375 Cabot Drive Zip: 60532
8. Company Contact and Title George Lytwynyshyn / Director. Environmental, Health & Safety 9. Phone (630) 577-8879
10. E-mail George.Lytwynyshyn@ctscorp.com

Stationary Source (Facility) Information: **[Provide a plot plan (legal description/drawing of facility property) with overlay sketch of facility processes; Location of emission points; Pollutant type and distances to property boundaries]**

1. Facility Name CTS ElectronicComponents, Inc. 2. Street Address 4800 Alameda Blvd. NE
3. City Albuquerque ___ 4. State NM 5. Facility Phone (505) 348-4252 6. Facility Fax (505) 348-4395
7. Facility Mailing Address (Local) 4800 Alameda Blvd. NE Zip 87113 __
8. Latitude - Longitude or UTM Coordinates of Facility Latitude : 35° 11' 03" Longitude: -106° 35' 34"
9. Facility Contact and Title John Wakefiled / Environmental, Health & Safety Engineer 10. Phone (505) 348-4252 11.E-mail John.Wakefield@ctscorp.com

General Operation Information (if any further information request does not pertain to your facility, write N/A on the line or in the box)

1. Facility Type (description of your facility operations) Ceramic electronics, including piezoelectric components manufacturing
2. Standard Industrial Classification (SIC 4 digit #) 3679, Electronic Components
3. North American Industry Classification System (NAICS Code #) 3344 Semiconductor and Other Electronic Component Manufacturing
4. Is facility currently operating in Bernalillo County. Yes If yes, date of original construction 1981
   If no, planned startup is N/A
5. Is facility permanent Yes If no, give dates for requested temporary operation - from ____/____/_____ through ____/____/_____
6. Is facility process equipment new No If no, give actual or estimated manufacture or installation dates in the Process Equipment Table.
7. Is application for a modification, expansion, or reconstruction (altering process, or adding, or replacing process equipment, etc.) to an existing facility which will result in a change in emissions No. If yes, give the manufacture date of modified, added, or replacement equipment in the Process Equipment Table modification date column , or the operation changes to existing process/equipment which cause an emission increase.
8. Is facility operation (circle one) [Continuous Intermittent Batch]

9. Estimated % of production Jan-Mar 25% Apr-Jun 25% Jul-Sep 25% Oct-Dec 25%

10. Current or requested operating times of facility 24 hrs/day 7 days/wk 4.3 wks/mo 12 mos/yr

11. Business hrs 8 am to 5 pm

12. Will there be special or seasonal operating times other than shown above__No_____ If yes, explain N/A

13. Raw materials processed Ceramic compounds see Material and Fuel Storage Table of this application.

14. Saleable item(s) produced Electronic components; Radio Frequency Filters, Electromagnetic components, Piezo-electric components.

15. Permitting Action Being Requested

☐ New Permit ☑ Permit Modification ☐ Technical Permit Revision ☐ Administrative Permit Revision

Current Permit #: 217-M5 Current Permit #:_____ Current Permit #: _____

PROCESS EQUIPMENT TABLE

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp - HR. ~~YR.~~	Diesel
Example 2. Spray Gun	HVLP Systems	Spra –N- Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal. - HR. ~~YR.~~	Electric Compressor
Existing permitted emission units affected by the proposed permit modification. Note: Information in *Italic* was added for clarification purposes only.								
1. Dust Collector #1 (PZT Powder Pack, cartridge filters *(Also known as DC-1)*	Farr Ten-Kay Co.	TENKAY Dust Collector 20-L-JD	87DC2387	1981	1981	To be replaced by new DC-4 in 2016	15 HP	Electric
2. Dust Collector #2 (RF Foundry East) *(Also known as DC-2)*	AAF International	Optiflow 1646876-1	OP950051	1995	5/1995	N/A	40 HP, ~95% filter efficiency, ~20 KCFM	Electric
3. Dust Collector #3 (RF Foundry East)	AAF International	Optiflow 1646876-1	OP 950052	1995	10/1995	To be reinstalled in 2016	40 HP, ~95% filter efficiency, ~20 KCFM	Electric
4. Spray Dryer #1 *(Also known as SD-1, Equip. #4,* to be connected to DC-4*)*	Niro-Atomizer	S12-5N-GCB-3	N/A	1981	1981	N/A	0.67 MMBtu/hr	Natural Gas
5. Spray Dryer #2 *(Also known as SD-2, Equip. #5,* to be connected to DC-4*)*	Niro-Atomizer	S12-5N-ECB-3	N/A	1981	1981	N/A	0.67 MMBtu/hr	Electric
6. Spray Dryer #3 *(Also known as SD-3, Equip. #6,* to be connected to DC-4*)*	Anhydro, Inc	Type III-AK Series 2	J-2314	1995	1995	Reinstalled 3/2009	0.49 MMBtu/hr	Natural Gas
7. Facility fume hood ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust – Solvent Stack, N-1)*	Custom Fabrication and Baldor Blower	N41101	0999 C	1981	1981	N/A	40 HP	Electric
8. UF-1 Raw Material Batching	Continental Air Filter Co – NY Blower	N/A	119215	1981	1981	N/A	15 HP, ~99.95% filter efficiency, ~10 KCFM	Electric
9. UF-2 Raw Material Batching	Continental Air Filter Co – NY Blower	N/A	119216	1981	1981	N/A	15 HP, , ~99.95% filter efficiency, ~10 KCFM	Electric
10. UF-3 Raw Material Batching	Continental Air Filter Co – NY Blower	N/A	119217	1981	1981	N/A	15 HP, , ~99.95% filter efficiency, ~10 KCFM	Electric
11a. Boiler *(Also known as B1 or PH-1. Only for comfort heating.)*	Peerless	211-35-WP-1	211-6534	1981	1981	N/A	7.14 MMBtu/hr	Natural Gas
11b. Boiler *(This unit is shared with CNM. Only for comfort heating. Operated only 4,380 hours per year.)*	Peerless	211A-19-WP-1	211A-5114-0990	1987	1990	N/A	3.78 MMBtu/hr	Natural Gas
11c. Boiler *(This unit is shared with CNM. Only for comfort heating. Operated only 4,380 hours per year.)*	Peerless	211A-19-WP-1	211A-5714-0990	1987	1990	N/A	3.78 MMBtu/hr	Natural Gas
11d. Boiler *(Please remove this boiler from this permit since it belongs to CNM.)*	Peerless	211-08-N	211A-9400-1293	1991	1993	N/A	1.50 MMBtu/hr	Natural Gas

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
11e. Boiler *(Please remove this boiler from this permit since it belongs to CNM.)*	Peerless	211-08-N	211A-9901-0894	1991	1993	N/A	1.50 MMBtu/hr	Natural Gas
11f. Boiler *(Please remove this boiler from this permit since it belongs to CNM.)*	Peerless	211-08-N	TBD	1991	1993	N/A	1.50 MMBtu/hr	Natural Gas
12. Building Fugitives (General Ventilation) *(Please remove from permit since former emissions transferred to other exhaust stacks, e.g., N-1.)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13. Midsaws Exhaust (IL1, *also known as UF-16), (Please remove from permit since to be connected to FEU-1*)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14. Centerless Grinding (UF10 or CG-1)*(Please remove from permit since to be connected to FEU-1*)	OHMIYA Machinery Co	16A	1774	1977	N/A	N/A	N/A	N/A
15. Clean Room Exhaust *(aka, UF18,) (Please remove from permit since to be connected to DC-3)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16. Emergency Generator *(Please remove from permit since decommissioned)*	Cummins	4 BT-3.9-GI	N/A	N/A	N/A	N/A	86 hp/ 50 Kw	Diesel
17. Fire Pump Engine *(Please remove from permit since decommissioned)*	Cummins	239/3.9 B0793 4 BT-3.9	44530410	9/27/1990	N/A	N/A	251 hp	Diesel
Additional emission units involved with the proposed permit modification Note: Information in *Italics* added for clarification purposes only.								
20. EMC kiln Room Vent *(Also known as EMC, to be connected to DC-3)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
21. Solvent Storage Shed *(a.k.a,, EF-1 and proposed as "CHEM")*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22. Stack OD-3, Dryer D3 (to be connected to DC-3)	Despatch Industries	LBC2-32-1	148934	Unknown	2/1999	N/A	260°C 16 kW	Electric
23a. Stack OD-4 Dryer D5 (to be connected to DC-3)	Blue M	POM-324 EX	P5-1049	Unknown	2/1999	N/A	204°C 2-8V 3PH 60 HZ 45 A	Electric
23b. Stack OD-4 Dryer D8 (on same stack with 23a connected to DC-3)	Despatch Industries	LBC2-32-1	Unknown	Unknown	2/1999	N/A	260°C 16 kW	Electric
24. Harrop[1] 1 •H-1(UF-1): also known as Heat Shroud •H-1(DC-4) :also known as PZT RTC, as H1.2 or as Exhaust Trap 6" •H-1(DC-3): Heat, or as Return Track Cooling inline blower + Kiln Cooling Unit blower	Harrop Industries, Inc.	NMR-PPG-23-483150-2640	1752/4210	1980s	1980s	N/A	Electric 200 Amps 480v-3ph-60Hz, 1280°C, High Fire	Electric

[1] Note: Harrop units can have multiple discharge points that discharge heat, particle matter and even lead to multiple duct works connected to different systems, therefore special distinctions are made for each discharge. For example, H-1(UF-1) mean Harrop-1 discharging through stack or system UF-1. The ": PM & Lead" means that it will discharge PM and Lead.

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
25. Harrop 2 •H-2(UF-1): also known as Heat Shroud •H-2(DC-4): also known as RTC or as Exhaust Trap 6" •H-2(DC-3): Heat, or as Return Track Cooling inline blower + Kiln Cooling Unit blower	Harrop Industries, Inc.	NMR-PPG-23-483150-2640	4122/1752	1980s	1980s	N/A	Electric 200 Amps 480v-3ph-60Hz, 860°C, Bisque Fire	Electric
26. Harrop 3 •H-3(UF-1): also known as Heat Shroud •H-3(DC-3): RTC - contact & non-contact, •H-3 (DC-4): Exhaust Trap Exhaust Trap 6"	Harrop Industries, Inc.	NMR-PPG-23-483150-2640	4122/1753	1980s	1980s	N/A	Electric 200 Amps 480v-3ph-60Hz, 860°C, Bisque Fire	Electric
27. PZT Room Heat exhaust *(Also known as N-2, to be connected to DC-4)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
28. OV1 *(to be connected to DC-4)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
29. DF3 *(to be connected to DC-4)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
30. Harrop 6 •H-6 (DC-3): RTC contact, known as H7.3 at 18" ID •H-6 (DC-3): RTC non-contact kiln cooling known as H7.2 at 10" ID •H-6 (DC-3): Heat, also known as Heat shroud to UF-26 •H-6 (DC-4): Exhaust trap	Harrop Industries, Inc.	NMR-PPG-23-483310-2640	4005	1980s	1980s	N/A	Electric 200 Amps 480v-3ph-60Hz,1320°C High Fire	Electric
31. Harrop 9 via UF-26 •H-9 (DC-2):Exhaust Trap 6" •H-9 (DC-3): Heat, also known as Heat shroud 20" + Return Track Cooling inline blower 18"	Harrop Industries, Inc.	NMR-PPG-23-483310-2640	4005	1980s	1980s	N/A	Electric 200 Amps 480v-3ph-60Hz,1320°C High Fire	Electric
32. Multiple Process (Also known as UF24, to be connected to DC-4)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
33. UF-26 (to be connected to DC-3)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
34. UF-9 (to be connected to FEU-1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
35. Machine Shop N. Fan (Also known as UF-5, *to be connected to FEU-1*)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
36. CNC Machines (Also known as UF-15, *to be connected to FEU-1*)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Electric
37. Harrop 5 •H-5(DC-3 H): Heat, also known as UF-28 or as Harrop 5 heat shroud •H-5(DC-3): Heat, also known as Return Track Cooling NC + C •H-5(DC-4):PM & Lead , also known as Exhaust Trap 4" Roof	Harrop Industries, Inc.	NMR-PPG-23-483330-2640	3687/4286	1980s	1980s	N/A	Electric 600 Amps 480v-3ph-60Hz, 1107°C calcine, 1345° C High Fire	Electric

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
38. Harrop 4 •H-4(DC-3): Heat, also known as UF-27 and as Heat Shroud + Return Track Cooling NC + C •H-4(DC-2): also known as Exhaust Trap 6" Roof	Harrop Industries, Inc.	NMR-PPG-23-483185-2640	3337/4285	1980s	1980s	N/A	Electric 500 Amps 480v-3ph-60Hz	Electric
39. Filtered Exhaust Unit #1, a.k.a, FEU-1	Camfil - Farr	CF-2x3-412P-3GB-SS	E35837	10/2015	~2016	N/A	12,000 CFM 99.99% Ultra efficiency on 0.3 micron or larger PM	Electric
40. New Dust Collector #4, a.k.a, DC-4	Camfil - Farr	GS40	E11794001	11/25/15	~2016	N/A	20,000 CFM, HEPA 99.97% efficiency on 0.3 micron or larger PM	Electric
41. Harrop 10 •H-10 (UF-3): Heat shroud •H-10(UF-3): RTC blower •H-10(UF-3):Kiln cooling blower •H-3 (DC-4): Exhaust trap 6"	Harrop Industries, Inc.	NMR-PPG-23-483185-2640	4026	1980s	1980s	N/A	Electric 300 Amps 480v-3ph-60Hz, 860°C High Fire	Electric
42. Harrop 14 •H-14(DC-4):Kiln Cooling Unit blower + Exhaust Trap 6"	Harrop Industries, Inc.	NMR-PPG-23-483330-2400	3988	1980s	1980s	N/A	Electric 300 Amps 480v-3ph-60Hz, 940°C Calcine	Electric

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) **Manufacturer's data.**
   Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

TABLE EXEMPTED SOURCES AND EXEMPTED ACTIVITIES

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp - HR. ~~YR.~~	Diesel
Example 2. Spray Gun	HVLP Systems	Spra –N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal. - HR. ~~YR.~~	Electric Compressor
101.Hot Water Heater (HW-1)	Rheem	GHE100-200A	132596	09/2012	12/2012	12/2012	199,000 Btu/hr	Natural Gas
102. Hot Water Heater (HW-2)	Rheem	GHE100-200A	132593	09/2012	12/2012	12/2012	199,000 Btu/hr	Natural Gas
103.Renzo Space Heater (UH-1)	Reznor	UDAP100	BFL79Y2N36145X	12/2006	5/2007	N/A	105,000 BTU/hr.	Natural Gas
104. Renzo Space Heater (UH-2)	Reznor	UDAP100	BFL79Y2N36131X	TBD	TBD	N/A	105,000 BTU/hr.	Natural Gas

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) Manufacturer's data and Field Observation
   Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)
UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**AP-42**
1. Generator	**1a. 39.9 tons/yr**	**121.3 tons/yr**	**5.7 tons/yr**	**2.2 tons/yr**	**8.8 tons/yr**	
7.Facility Fume Hood Ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust –Solvent Stack, N-1)*	----[2] lbs/hr	---- lbs/hr	2.9 lbs/hr	---- lbs/hr	0.049 lbs/hr	Stack tested
	---- tons/yr	---- tons/yr	6.2 tons/yr	---- tons/yr	0.22 tons/yr	
8. UF-1 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	274.9 lbs/hr	Engineering estimate based on stack test of a similar unit.
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	1,203.9 tons/yr	
9. UF-2 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	259.2 lbs/hr	Stack tested
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	1,135.3 tons/yr	
10. UF-3 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	49.7 lbs/hr	Stack tested
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	217.6 tons/yr	
11a. Boiler (also known as B1 or PH-1)	0.71 lbs/hr	0.84 lbs/hr	0.043 lbs/hr	0.10 lbs/hr	0.060 lbs/hr	AP-42
	3.1 tons/yr	3.7 tons/yr	0.19 tons/yr	0.45 tons/yr	0.26 tons/yr	
11b. Boiler	0.34 lbs/hr	0.41 lbs/hr	0.023 lbs/hr	0.054 lbs/hr	0.032 lbs/hr	AP-42
	0.75 tons/yr	0.89 tons/yr	0.050 tons/yr	0.12 tons/yr	0.069 tons/yr	
11c. Boiler	0.34 lbs/hr	0.41 lbs/hr	0.023 lbs/hr	0.054 lbs/hr	0.032 lbs/hr	AP-42
	0.75 tons/yr	0.89 tons/yr	0.050 tons/yr	0.12 tons/yr	0.069 tons/yr	
21. Solvent Storage Shed (a.k.a, EF-1 and proposed as "CHEM")	---- lbs/hr	---- lbs/hr	2.8 lbs/hr	---- lbs/hr	---- lbs/hr	Mass Balance
	---- tons/yr	---- tons/yr	12.4 tons/yr	---- tons/yr	---- tons/yr	
40. Stack DC-4 Description: This stack will combine the emission from the unit listed below. Although this system will use a two stage "green" Farr® HEPA filter with a 99.97% efficiency, the uncontrolled emissions are presented in this table. Please refer to table C-2 in the calculation table for additional information.	0.014 lbs/hr	0.015 lbs/hr	0.00093 lbs/hr	0.0022 lbs/hr	12.9 lbs/hr	Engineering estimate based on stack test of a similar units.
	0.061 tons/yr	0.066 tons/yr	0.0041 tons/yr	0.010 tons/yr	56.3 tons/yr	
39. Stack **FEU-1** Description: This stack will combine the emission from the unit listed below. Although	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.20 lbs/hr	Engineering estimate based on stack test of a similar units.

[2] (---) =not a source of emissions

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
this system will use an ultra-high efficiency HEPA filter, 99.99% efficiency, the uncontrolled emissions are presented in this table. Please refer to table C-3 in the calculation table for additional information.	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.90 tons/yr	
2. Stack **DC-2** Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Please refer to table C-5 in the calculation table for additional information.	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	3.8 lbs/hr	Stack tested
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	16.5 tons/yr	
3. Stack **DC-3** Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Please refer to table C-4 in the calculation table for additional information.	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.37 lbs/hr	Engineering estimate based on stack test of a similar units.
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	1.6 tons/yr	
101. HW-1 Nat Gas Water Heater	0.036 lbs/hr	0.039 lbs/hr	0.0024 lbs/hr	0.0057 lbs/hr	0.0033 lbs/hr	AP-42
	0.16 tons/yr	0.17 tons/yr	0.011 tons/yr	0.025 tons/yr	0.015 tons/yr	
102. HW-2 Nat Gas Water Heater	0.036 lbs/hr	0.039 lbs/hr	0.0024 lbs/hr	0.0057 lbs/hr	0.0033 lbs/hr	AP-42
	0.16 tons/yr	0.17 tons/yr	0.011 tons/yr	0.025 tons/yr	0.015 tons/yr	
103. UH-1 REZNOR Nat Gas Heater	0.045 lbs/hr	0.049 lbs/hr	0.0030 lbs/hr	0.0071 lbs/hr	0.0042 lbs/hr	AP-42
	0.20 tons/yr	0.21 tons/yr	0.013 tons/yr	0.031 tons/yr	0.018 tons/yr	
104. UH-2 REZNOR Nat Gas Heater	0.045 lbs/hr	0.049 lbs/hr	0.0030 lbs/hr	0.0071 lbs/hr	0.0042 lbs/hr	AP-42
	0.20 tons/yr	0.21 tons/yr	0.013 tons/yr	0.031 tons/yr	0.018 tons/yr	
Totals of Uncontrolled Emissions	1.6 lbs/hr	1.8 lbs/hr	5.8 lbs/hr	0.24 lbs/hr	601.2 lbs/hr	
	5.4 tons/yr	6.3 tons/yr	19.0 tons/yr	0.81 tons/yr	2,633.0 tons/yr	

*** If any one (1) of these process units, <u>or</u> combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. <u>Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)</u>**

*** If all of these process units, individually <u>and</u> in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

<u>If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.</u>

UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Lead (Pb)	Silver (Ag)	HAPs (excluding lead)			Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**lbs/hr**	**lbs/hr**	**AP-42**
1. Generator	**1a. 39.9 tons/yr**	**121.3 tons/yr**	**5.7 tons/yr**	**tons/yr**	**tons/yr**	
7. Facility Fume Hood Ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust –Solvent Stack, N-1*	3.5E-5 lbs/hr	0.029 lbs/hr	0.10 lbs/hr			**AP-42**
	0.00014 tons/yr	0.013 tons/yr	0.43 tons/yr			
8. UF-1 Raw Material Batching	0.037 lbs/hr	---- lbs/hr	---- lbs/hr			Stack tested
	0.16 tons/yr	---- tons/yr	---- tons/yr			
9. UF-2 Raw Material Batching	0.029 lbs/hr	---- lbs/hr	---- lbs/hr			Engineering estimate based on stack test of a similar unit.
	0.13 tons/yr	---- tons/yr	---- tons/yr			
10. UF-3 Raw Material Batching	0.0060 lbs/hr	---- lbs/hr	---- lbs/hr			Stack tested
	0.026 tons/yr	---- tons/yr	---- tons/yr			
11a. Boiler (also known as B1 or PH-1)	---- lbs/hr	---- lbs/hr	0.018 lbs/hr			Stack tested
	---- tons/yr	---- tons/yr	0.081 tons/yr			
11b. Boiler	---- lbs/hr	---- lbs/hr	0.0049 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.022 tons/yr			
11c. Boiler	---- lbs/hr	---- lbs/hr	0.0049 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.022 tons/yr			
21. Solvent Storage Shed (a.k.a,, EF-1 and proposed as "CHEM")	---- lbs/hr	---- lbs/hr	0.40 lbs/hr			Mass Balance
	---- tons/yr	---- tons/yr	1.7 tons/yr			
40. Stack DC-4 Description: This stack will combine the emission from the unit listed below. Although this system will use a two stage "green" Farr® HEPA filter with a 99.97% efficiency, the uncontrolled emissions are presented in this table. Please refer to table C-2, in the calculations, for additional information.	0.019 lbs/hr	---- lbs/hr	---- lbs/hr			Engineering estimate based on stack test of a similar units.
	0.084 tons/yr	---- tons/yr	---- tons/yr			
39. Stack **FEU-1** Description: This stack will combine the emission from the unit listed below. Although this system will use an ultra-high efficiency HEPA filter, 99.99% efficiency, the uncontrolled emissions are presented in this table. Please refer to table C-3, in the calculations, for additional information.	1.8 E-5 lbs/hr	---- lbs/hr	---- lbs/hr			Engineering estimate based on stack test of a similar units.
	7.8 E-5 tons/yr	---- tons/yr	---- tons/yr			

Process Equipment Unit*	Lead (Pb)	Silver (Ag)	HAPs (excluding lead)			Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
2. Stack **DC-2** Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Please refer to table C-5, in the calculations, for additional information.	0.0018 lbs/hr	---- lbs/hr	---- lbs/hr			Stack tested
	0.0078 tons/yr	---- tons/yr	---- tons/yr			
3. Stack **DC-3** Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Please refer to table C-4, in the calculations, for additional information.	0.00023 lbs/hr	---- lbs/hr	---- lbs/hr			Engineering estimate based on stack test of a similar units.
	0.0010 tons/yr	---- tons/yr	---- tons/yr			
101. HW-1 Nat Gas Water Heater	---- lbs/hr	---- lbs/hr	0.0058 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.025 tons/yr			
102. HW-2 Nat Gas Water Heater	---- lbs/hr	---- lbs/hr	0.0058 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.025 tons/yr			
103. UH-1 REZNOR Nat Gas Heater	---- lbs/hr	---- lbs/hr	0.054 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.24 tons/yr			
104. UH-2 REZNOR Nat Gas Heater	---- lbs/hr	---- lbs/hr	0.054 lbs/hr			AP-42
	---- tons/yr	---- tons/yr	0.24 tons/yr			
Totals of Uncontrolled Emissions	0.094 lbs/hr	0.029 lbs/hr	0.55 lbs/hr			
	0.41 tons/yr	0.013 tons/yr	2.4 tons/yr			

*** If any one (1) of these process units, <u>or</u> combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. <u>Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)</u>**

*** If all of these process units, individually <u>and</u> in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

<u>If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.</u>

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
Example 1. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**Operating Hours**	**N/A**
	1a. 18.2 tons/yr	**55.4 tons/yr**	**2.6 tons/yr**	**1.0 tons/yr**	**4.0 tons/yr**		
7.Facility Fume Hood Ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust –Solvent Stack, N-1*	---- lbs/hr	---- lbs/hr	2.9 lbs/hr	---- lbs/hr	0.049 lbs/hr	None	N/A
	---- tons/yr	---- tons/yr	6.2 tons/yr	---- tons/yr	0.22 tons/yr		
8. UF-1 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.14 lbs/hr	None	N/A
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.60 tons/yr		
9. UF-2 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.13 lbs/hr	None	N/A
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.57 tons/yr		
10. UF-3 Raw Material Batching	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.025 lbs/hr	None	N/A
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.11 tons/yr		
11a. Boiler (also known as B1 or PH-1)	0.71 lbs/hr	0.84 lbs/hr	0.043 lbs/hr	0.10 lbs/hr	0.060 lbs/hr	None	N/A
	3.1 tons/yr	3.7 tons/yr	0.19 tons/yr	0.45 tons/yr	0.26 tons/yr		
11b. Boiler	0.34 lbs/hr	0.41 lbs/hr	0.023 lbs/hr	0.054 lbs/hr	0.032 lbs/hr	None	N/A
	0.75 tons/yr	0.89 tons/yr	0.050 tons/yr	0.12 tons/yr	0.069 tons/yr		
11c. Boiler	0.34 lbs/hr	0.41 lbs/hr	0.023 lbs/hr	0.054 lbs/hr	0.032 lbs/hr	None	N/A
	0.75 tons/yr	0.89 tons/yr	0.050 tons/yr	0.12 tons/yr	0.069 tons/yr		
21. Solvent Storage Shed (*a.k.a,, EF-1 and proposed as "CHEM"*)	---- lbs/hr	---- lbs/hr	2.8 lbs/hr	---- lbs/hr	---- lbs/hr	None	N/A
	---- tons/yr	---- tons/yr	12.4 tons/yr	---- tons/yr	---- tons/yr		
40. Stack DC-4 Description: This stack will combine the emission from the unit listed Table C-2, in the calculations, for additional information.	0.014 lbs/hr	0.15 lbs/hr	0.0093 lbs/hr	0.0022 lbs/hr	0.0039 lbs/hr	Farr® HEPA filter	99.97% @ 0.3 µm
	0.061 tons/yr	0.066 tons/yr	0.0041 tons/yr	0.0096 tons/yr	0.017 tons/yr		
39. Stack **FEU-1** Description: This stack will combine the emission from the unit listed in table C-3, in the calculations, for additional information.	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	2.0 E-5 lbs/hr	Ultra-high efficiency HEPA filter	99.99% @ 0.3 µm
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	9.0 E-5 tons/yr		
2. Stack **DC-2** Description: This stack will combine the emission from the unit listed in table C-5, in the calculations, for additional information.	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.19 lbs/hr	Filter	95% @ 0.3 µm
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.83 tons/yr		

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
3. Stack **DC-3** Description: This stack will combine the emission from the unit listed in table C-4, in the calculations, for additional information.	---- lbs/hr	---- lbs/hr	---- lbs/hr	---- lbs/hr	0.019 lbs/hr	Filter	95% @ 0.3 µm
	---- tons/yr	---- tons/yr	---- tons/yr	---- tons/yr	0.082 tons/yr		
101. HW-1 Nat Gas Water Heater	0.036 lbs/hr	0.039 lbs/hr	0.0024 lbs/hr	0.0057 lbs/hr	0.0033 lbs/hr	None	N/A
	0.16 tons/yr	0.17 tons/yr	0.011 tons/yr	0.025 tons/yr	0.015 tons/yr		
102. HW-2 Nat Gas Water Heater	0.036 lbs/hr	0.039 lbs/hr	0.0024 lbs/hr	0.0057 lbs/hr	0.0033 lbs/hr	None	N/A
	0.16 tons/yr	0.17 tons/yr	0.011 tons/yr	0.025 tons/yr	0.015 tons/yr		
103. UH-1 REZNOR Nat Gas Heater	0.045 lbs/hr	0.049 lbs/hr	0.0030 lbs/hr	0.0071 lbs/hr	0.0042 lbs/hr	None	N/A
	0.20 tons/yr	0.21 tons/yr	0.013 tons/yr	0.031 tons/yr	0.018 tons/yr		
104. UH-2 REZNOR Nat Gas Heater	0.045 lbs/hr	0.049 lbs/hr	0.0030 lbs/hr	0.0071 lbs/hr	0.0042 lbs/hr	None	N/A
	0.20 tons/yr	0.21 tons/yr	0.013 tons/yr	0.031 tons/yr	0.018 tons/yr		
Totals of Controlled Emissions	1.6 lbs/hr	1.8 lbs/hr	5.8 lbs/hr	0.24 lbs/hr	0.69 lbs/hr		
	5.4 tons/yr	6.3 tons/yr	19.0 tons/yr	0.81 tons/yr	2.9 tons/yr		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.) Manufacturer Data and AP-42 Emission factors associated to the proposed unit are included in this permit application.
Submit information for each unit as an attachment

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes: No fugitive emissions are present in the current permit.

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES
(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Lead (Pb)	Silver (Ag)	HAPs (excluding lead)			Control Method	% Efficiency
Example 1. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**			**Operating Hours**	**N/A**
	1a. 18.2 tons/yr	**55.4 tons/yr**	**5.7 tons/yr**				
7.Facility Fume Hood Ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust –Solvent Stack, N-1*	3.5E-5 lbs/hr	0.029 lbs/hr	0.10 lbs/hr			None	N/A
	1.4E-4 tons/yr	0.013 tons/yr	0.43 tons/yr				
8. UF-1 Raw Material Batching	1.9E-5 lbs/hr	---- lbs/hr	---- lbs/hr			None	N/A
	8.5E-5 tons/yr	---- tons/yr	---- tons/yr				
9. UF-2 Raw Material Batching	1.5E-5 lbs/hr	---- lbs/hr	---- lbs/hr			None	N/A
	6.4E-5 tons/yr	---- tons/yr	---- tons/yr				
10. UF-3 Raw Material Batching	3.0E-6 lbs/hr	---- lbs/hr	---- lbs/hr			None	N/A
	1.3E-5 tons/yr	---- tons/yr	---- tons/yr				

Process Equipment Unit	Lead (Pb)	Silver (Ag)	HAPs (excluding lead)			Control Method	% Efficiency
11a. Boiler (also known as B1 or PH-1)	---- lbs/hr	---- lbs/hr	0.018 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.081 tons/yr				
11b. Boiler	---- lbs/hr	---- lbs/hr	0.0049 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.022 tons/yr				
11c. Boiler	---- lbs/hr	---- lbs/hr	0.0049 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.022 tons/yr				
21. Solvent Storage Shed (*a.k.a.,, EF-1 and proposed as "CHEM"*)	---- lbs/hr	---- lbs/hr	0.40 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	1.7 tons/yr				
40. Stack DC-4 Description: This stack will combine the emission from the unit listed Table C-2, in the calculations, for additional information.	5.8E-6 lbs/hr	---- lbs/hr	---- lbs/hr			Farr® HEPA filter	99.97% @ 0.3 µm
	2.5E-5 tons/yr	---- tons/yr	---- tons/yr				
39. Stack **FEU-1** Description: This stack will combine the emission from the unit listed in table C-3, in the calculations, for additional information.	1.8E-9 lbs/hr	---- lbs/hr	---- lbs/hr			Ultra-high efficiency HEPA filter	99.99% @ 0.3 µm
	7.8E-9 tons/yr	---- tons/yr	---- tons/yr				
2. Stack **DC-2** Description: This stack will combine the emission from the unit listed in table C-5, in the calculations, for additional information.	9.1E-5 lbs/hr	---- lbs/hr	---- lbs/hr			Filter	95% @ 0.3 µm
	4.0E-4 tons/yr	---- tons/yr	---- tons/yr				
3. Stack **DC-3** Description: This stack will combine the emission from th e unit listed in table C-4, in the calculations, for additional information.	1.2E-5 lbs/hr	---- lbs/hr	---- lbs/hr			Filter	95% @ 0.3 µm
	5.1E-5 tons/yr	---- tons/yr	---- tons/yr				
101. HW-1 Nat Gas Water Heater	---- lbs/hr	---- lbs/hr	0.0058 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.025 tons/yr				
102. HW-2 Nat Gas Water Heater	---- lbs/hr	---- lbs/hr	0.0058 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.025 tons/yr				
103. UH-1 REZNOR Nat Gas Heater	---- lbs/hr	---- lbs/hr	0.054 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.24 tons/yr				
104. UH-2 REZNOR Nat Gas Heater	---- lbs/hr	---- lbs/hr	0.054 lbs/hr			None	N/A
	---- tons/yr	---- tons/yr	0.24 tons/yr				
Totals of Controlled Emissions	1.8E-4 lbs/hr	2.9E-3 lbs/hr	0.55 lbs/hr				
	7.8E-4 tons/yr	1.3E-2 tons/yr	2.4 tons/yr				

**TOXIC EMISSIONS

VOLATILE, HAZARDOUS, & VOLATILE HAZARDOUS AIR POLLUTANT EMISSION TABLE

Product Categories (Coatings, Solvents, Thinners, etc.)	Volatile Organic Compound (VOC), Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service Number (CAS) Of VOC, HAP, Or VHAP From Representative As Purchased Product	VOC, HAP, Or VHAP Concentration Of Representative As Purchased Product (pounds/gallon, or %)	1. How were Concentrations Determined (CPDS, MSDS, etc.)	Total Product Purchases For Category	(-)	Quantity Of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
EXAMPLE 1. Surface Coatings	XYLENE	1330207	4.0 LBS./GAL	MSDS	lbs/yr 100 gal/yr	(-)	lbs/yr - 0 - gal/yr	(=)	lbs/yr 100 gal/yr
EXAMPLE 2. Cleaning Solvents	TOLUENE	108883	70%	PRODUCT LABEL	lbs/yr 200 gal/yr	(-)	lbs/yr 50 gal/yr	(=)	lbs/yr 150 gal/yr
Emitted from combination of Solvent Shed and N-1 stack with "CHEM" approach from Chemical Substances, VOCs and HAPs[3]									
I. Cleaning Solvent	Methanol	67-56-1	100 %	MSDS	≈ 3,000 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 3,000 lbs/yr gal/yr
II. Cleaning Solvent	Isopropyl Alcohol	67-63-0	100 %	MSDS	≈ 8,300 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 8,300 lbs/yr gal/yr
III. Cleaning Solvent	IPAL IPA, Toluene, Methyl isobutyl ketone	67-63-0, 108-88-3, 108-10-1	94% (minus the non-VOC 6% acetone)	MSDS	≈ 725 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 725 lbs/yr gal/yr
IV. Ink	Videojet Ink Methyl ethyl ketone, Ink, other	78-93-3	100 %	MSDS	≈ 15 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 15 lbs/yr gal/yr
V. Ink Makeup Fluid	Videojet Makeup Fluid Methyl ethyl ketone, Ink, other	78-93-3	100 %	MSDS	≈ 300 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 300 lbs/yr gal/yr
VI. Electrical Conductor	Silver Conductor Holecoat Xylene, Ethyl Benzene and other misc. solvents	1330-20-7, 100-41-4	100 %	MSDS	≈ 20 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 20 lbs/yr gal/yr
VII. Electrical Conductor	Silver Conductor HIVOC Spray Terpineol and misc. solvent	98-55-5	100 %	MSDS	≈ 25 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 25 lbs/yr gal/yr
VIII. Cleaning Solvent	Silver-7314 Xylene, and misc. solvents	1330-20-7	100 %	MSDS	≈ 10 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 10 lbs/yr gal/yr
IX. Cleaning Solvent	Silver HPZT Ceronic AG 918 Xylene, and misc. solvents	1330-20-7	100 %	MSDS	≈ 15 lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	≈ 15 lbs/yr gal/yr
X. Cleaning Solvent	Silver HPZT Ceronic AG 918A Xylene, and misc. solvents	1330-20-7	100 %	MSDS	≈ 5 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 5 lbs/yr gal/yr

[3] *Material volumes per year represent a rough yearly estimated that was prepared using the 2014 Air Emission Inventory. These chemicals are associated to Solvent Storage Shed, therefore, to provide permit coverage a safety factor of 100% was added to enable operational flexibility with a "CHEM" approach as AQP has approved before.*

Product Categories (Coatings, Solvents, Thinners, etc.)	Volatile Organic Compound (VOC), Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service Number (CAS) Of VOC, HAP, Or VHAP From Representative As Purchased Product	VOC, HAP, Or VHAP Concentration Of Representative As Purchased Product (pounds/gallon, or %)	1. How were Concentrations Determined (CPDS, MSDS, etc.)	Total Product Purchases For Category	(-)	Quantity Of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
XI. Cleaning Solvent	Silver - HPZT AG 921-S Xylene, and misc. solvents	1330-20-7	100 %	MSDS	≈ 30 lbs/yr gal/yr	(-)	≈ 0 lbs/yr gal/yr	(=)	≈ 30 lbs/yr gal/yr
XII. Polyethylene Glycol 200 Binder	Ethylene Glycol	107-21-1	1%	MSDS	≈ 3,100 lbs/yr gal/yr	(-)	≈ 1,550 lbs/yr gal/yr	(=)	≈ 3,100 lbs/yr gal/yr
XIII. Dupont Silver Paste 7307J Holecoat	Xylene	1330-20-7	30%	MSDS	≈ 80 lbs/yr gal/yr	(-)	≈ 40 lbs/yr gal/yr	(=)	≈ 80 lbs/yr gal/yr
XIV. Dupont Silver Paste 7314	Xylene	1330-20-7	10%	MSDS	≈ 25 lbs/yr gal/yr	(-)	≈ 12.5 lbs/yr gal/yr	(=)	≈ 25 lbs/yr gal/yr
Natural Gas Fuel Combustion Related HAPs[4]									
I. Spray Dryer #1	HAP	N/A	N/A	GRI-HapCalc 3.01®	≈ 0.0002 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 0.0002 lbs/yr gal/yr
II. Spray Dryer #3	HAP	N/A	N/A	GRI-HapCalc 3.01®	≈ 0.00025 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 0.00025 lbs/yr gal/yr
III. Boiler 11a	HAP	N/A	N/A	GRI-HapCalc 3.01®	≈ 0.020 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 0.020 lbs/yr gal/yr
IV. Boiler 11b and 11c	HAP	N/A	N/A	GRI-HapCalc 3.01®	≈ 0.011 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 0.011 lbs/yr gal/yr
TOTAL >>>>>>>					≈ 15,520.0 lbs/yr gal/yr	(-)	0 lbs/yr gal/yr	(=)	≈ 15,520.0 lbs/yr gal/yr

1. Basis for percent (%) determinations (Certified Product Data Sheets, Material Safety Data Sheets, etc.). Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. Copy this Table if additional space is needed (begin numbering with XI., XII., etc.)

[4] *Lead HAP emissions were discussed in previous form tables, therefore they have not been redundantly accounted for in this table. In addition, the HAPs emissions associated to the natural gas fired water heaters HW-1 and HW-2 as well as those from the Reznor Heater were not included in this table. The yearly emissions per unit is less than 0.008 lbs/hr.*

****NOTE: A REGISTRATION IS REQUIRED, AT MINIMUM, FOR ANY AMOUNT OF HAP OR VHAP EMISSION. A PERMIT MAY BE REQUIRED FOR THESE EMISSIONS, DETERMINED ON A CASE-BY-CASE EVALUATION.**

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

MATERIAL AND FUEL STORAGE TABLE

(Tanks, barrels, silos, stockpiles, etc.) Copy this table if additional space is needed (begin numbering with 6., 7., etc.)

Storage Equipment	Product Stored	Capacity (bbls - tons gal - acres,etc)	Above or Below Ground	Construction (welded, riveted) & Color	Install Date	Loading Rate	Offloading Rate	True Vapor Pressure	Control Equipment	Seal Type	% Eff.
Example 1. Tank	diesel fuel	5,000 gal.	Below	welded/ brown	3/93	3000gal HR. ~~YR.~~	500 gal. - HR. ~~YR.~~	N/A Psia	N/A	N/A	N/A
Example 2. Barrels	Solvent	55 gal Drum	Above - in storage room	welded - green	N/A	N/A HR. YR.	N/A HR. YR.	N/A Psia	N/A	N/A	N/A
1. Barrels	Isopropyl Alcohol	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
2. Barrels	Methanol	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
3. Barrels	Acetone	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
4. Barrels	Hydro-lubric 120-B	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
5. Barrels	IPAL Thinner	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
6. Barrels	Isopar L	55 gal DM	Above, inside	Welded Dark	N/A	N/A	N/A	Psia	None	N/A	N/A
7. Barrels	Sodium Hydroxide	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
8. Barrels	Ferric Chloride	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
9. Barrels	Sulfuric acid	55 gal DF	Above, inside	Plastic blue	N/A	N/A	N/A	Psia	None	N/A	N/A
10. Barrels	Hydrogen Peroxide	55 gal DF	Above, inside	Plastic dark	N/A	N/A	N/A	Psia	None	N/A	N/A
11. Barrels	AZ300T stripper	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
12. Barrels	Polyethylene Glycol 200	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
13. Barrels	Polyethylene Glycol 400	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
14. Barrels	IPAL Thinner	55 gal DM	Above, inside	Welded Black	N/A	N/A	N/A	Psia	None	N/A	N/A
15. Barrels	Selvol PVA Soln.	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
16. Barrel	Aquacer 8942 Binder	55 gal DF	Above, inside	Fiber, brown	N/A	N/A	N/A	Psia	None	N/A	N/A
17. Barrels	Tamol 963 Dispersant	55 gal DF	Above, inside	Plastic black	N/A	N/A	N/A	Psia	None	N/A	N/A
18. Can	Lion Aq 3300 PAA Binder	5 gal. can	Above, inside	Welded can	N/A	N/A	N/A	Psia	None	N/A	N/A
19. Pail	Mulsifan L61 Antifoam	5 gal pail	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
20. Pail	Darvan C-N Dispersant	5 gal. pail	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
21. Pail	Darvan 821-A Dispersant	5 gal pail	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
22. Pail	Zusoplast 126 emulsifier	5 gal pail	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
Solid Materials											
23. IBC	Lead oxide Hammond	1 ton metric	Above, inside	Welded SS	N/A	N/A	N/A	Psia	None	N/A	N/A
24. IBC	Lead oxide Penox	1 ton metric	Above, inside	Composite packaging	N/A	N/A	N/A	Psia	None	N/A	N/A
25. Barrels	DK-2 Zirconium Oxide	50 Kg	Above, inside	Fiber drum	N/A	N/A	N/A	Psia	None	N/A	N/A
26. Bag	Brenntag Titanium Dioxide	50 Lbs	Above, inside	Bag	N/A	N/A	N/A	Psia	None	N/A	N/A
27. Barrels	Daiichi Zirconium Oxide	50 Kg	Above, inside	Fiber drum	N/A	N/A	N/A	Psia	None	N/A	N/A
28. Bag	Ishihara Titanium Dioxide	35 Kg	Above, inside	Bag	N/A	N/A	N/A	Psia	None	N/A	N/A
29. Barrels	Z Tech Zirconium Oxide	110 Lbs.	Above, inside	Fiber drum	N/A	N/A	N/A	Psia	None	N/A	N/A
30. Pail	Lanthanum Oxide	25 Kg	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
31. Pail	Strontium Titanate	25 Kg	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A

Storage Equipment	Product Stored	Capacity (bbls - tons gal - acres,etc)	Above or Below Ground	Construction (welded, riveted) & Color	Install Date	Loading Rate	Offloading Rate	True Vapor Pressure	Control Equipment	Seal Type	% Eff.
32. Box	Aluminum Oxide	25 Kg	Above, inside	Fiber box	N/A	N/A	N/A	Psia	None	N/A	N/A
33. Pail	TX-330 - Barium Titanite	25 Kg	Above, inside	Plastic white	N/A	N/A	N/A	Psia	None	N/A	N/A
34. Barrels	Tin Oxide (SnO2)	100 Lbs.	Above, inside	Fiber drum	N/A	N/A	N/A	Psia	None	N/A	N/A

1. Basis for Loading/Offloading Rate (Manufacturers data, Field Observation/Test, etc.) Submit information for each unit as an attachment
Field observation for container size and constructions

2. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.) Submit information for each unit as an attachment
Containers all stored in sealed condition, otherwise no controls are involved

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

STACK AND EMISSION MEASUREMENT TABLE

If any equipment from the Process Equipment Table (Page 2) is also listed in this Stack Table, use the same numbered line for the Process Equipment unit on both Tables to show the association between the Process Equipment and its Stack. Copy this table if additional space is needed (begin numbering with 6., 7., etc.).

Process Equipment	Pollutant (CO,NOx,TSP, Toluene,etc)	Control Equipment	Control Efficiency	Stack Height & Diameter in feet	Stack Temp.	Stack Velocity & Exit Direction	Emission Measurement Equipment Type	Range-Sensitivity-Accuracy-
Example 1. Generator	CO, NOx, TSP, SO_2, NMHC	N/A	N/A	18 ft. - H 0.8 ft. - D	225 ^{0}F	6,000 ft^3/min - V Exit - upward	N/A	N/A
Example 2. Spray Gun	TSP, xylene, toluene, MIBK	Paint Booth	99% for TSP	9 ft. - H 0.5 ft. -D	ambient	10,000 ft^3/min - V Exit - horizontal	N/A	N/A
7. Facility Fume Hood Ventilation (Hood Ventilation {N}) *(Also known as Main Exhaust – Solvent Stack, N-1*	Primarily VOCs with low levels of incidenttal TSP, Pb, Ag,	N/A	N/A	51' – H 60" - D	541.2°R	≈ 54,840 scf/min, upward	N/A	N/A
8. UF-1 Raw Material Batching	TSP, Pb	N/A	N/A	36' – H existing 42' – H future 26" X 29"	552.7°R	≈ 8,664 scf/min, 45 deg. existing, upward in future	N/A	N/A
9. UF-2 Raw Material Batching	TSP, Pb	N/A	N/A	36' – H existing 42' – H future 26" X 29"	539.7°R	≈ 4,677 scf/min, 45 deg. existing, upward in future	N/A	N/A
10. UF-3 Raw Material Batching	TSP, Pb	N/A	N/A	36' – H existing 42' – H future 26" X 29"	549.6°R	≈ 4,200 scf/min, 45 deg. existing, upward in future	N/A	N/A
21. Solvent Storage Shed (*a.k.a,, EF-1 and proposed as "CHEM"*)	VOCs, & HAPs	N/A	N/A	N/A	Passive venting through shed louvers, no stack, ambient temp.		N/A	N/A
40. Stack DC-4	TSP, Pb, NO_X, CO, VOC, SO_2	Farr® HEPA filter	99.97% efficiency	45.5 ft– H existing DC-1 42 ft. –H future DC-4 20" X 29"	570.2°R	≈ 19,912 scf/min, upward	N/A	N/A
39. Stack FEU-1	TSP, Pb	Farr Ultra-high efficiency filter	99.99% efficiency	42 ft. –H future 32" X 24"	542.8°R	≈ 12,000 scf/min, upward	N/A	N/A
2. Stack DC-2	TSP, Pb	HEPA filter	95% efficiency	38.5ft– H existing 42 ft. –H future 28" - D	548.9°R	≈ 11,073 scf/min, upward	N/A	N/A
3. Stack DC-3	TSP, Pb	HEPA filter	95% efficiency	42 ft. –H future 28" - D	541.8°R	≈ 20,000 scf/min, upward	N/A	N/A

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test,AP-42, etc.) Submit information for each unit as an attachment
Manufacturer Data and AP-42 Emission factors associated to the proposed unit are included in the Supporting Information sections of the permit application.

I, the undersigned, a responsible officer of the applicant company, certify that to the best of my knowledge, the information stated on this application, together with associated drawings, specifications, and other data, give a true and complete representation of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I also understand that any significant omissions, errors, or misrepresentations in these data will be cause for revocation of part or all of the resulting registration or permit.

Signed this_____ day of__November_____, 2016_____

Fred Baum _____ Acting Plant Manager _____
Print Name Print Title

_____
Signature

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

EMISSIONS CALCULATIONS

Table C-1: Emission Calculations for the continuing individual process emission units

Description: The five (5) separate stacks below will continue to discharge individually to the atmosphere. Unit 7/N-1 and Unit 21/EF-1 have no emissions control for their mostly dilute VOC emissions. The three (3) UF-1 through UF-3 (Units 8.-10.) will continue to emit controlled emissions from 99.95% efficient existing filtration.

	TSP								Lead									Silver						
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		New Controlled Emission			Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		New Controlled Emission			Exhaust Flow	Emission Rate (lb/hr)	SF	Uncontrolled		Control	Controlled	
Exhaust Units:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)		%	lb/hr	tpy	EFF%	lb/hr	tpy
7. Facility Fume Hood Ventilation (aka, Silver Electroding or Hood Ventilation {N}) (Also known as Main Exhaust –Solvent Stack, N-1)	0.0246	0.00	100	0.049	100.0	0.00	0.049	0.22	1.6E-05	0.00	100	3.3E-05	1.4E-04	0.00	3.3E-05	1.4E-04	24,850.2	1.9E-03	50	2.9E-03	1.3E-02	0.0%	2.9E-03	1.3E-02
9. UF-2 Raw Material Batching	0.0864	99.95	50	259.2	1135.3	99.95	0.13	0.57	9.7E-06	99.95	50	2.9E-02	1.3E-01	99.95	1.5E-05	6.4E-05	4,676.9							

Table C-1: Emission Calculations for the continuing individual process emission units (Cont.)

	VOC							
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled	
Unit:			%	lb/hr	tpy	EFF%	lb/hr	tpy
7. Facility Fume Hood Ventilation (aka, Silver Electroding or Hood Ventilation {N}) (Also known as Main Exhaust –Solvent Stack, N-1)	1.5	0.00	100	2.9	6.2	0.00	2.9	6.2
21. Solvent Storage Shed (Also known as EF-1)	1.4	0.00	100	2.8	12.4	0.00	2.8	12.4

Table C-2: TSP and Pb Emission Calculations for the combination of process exhaust units proposed to discharge to the proposed new DC-4 stack

Description: This stack will combine the emission from the exhaust units listed below. This new system will use new two stage "green" Farr® 99.97% efficient HEPA filtration to control emissions.

DC-4 Exhaust Flow:
Max design = 20,000.0 SCF/min
Current use = 15,760.1
79% Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Units:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
1. Dust Collector #1 (PZT Powder Pack) (Also known as DC-1)	0.015	95.00	50	0.44	1.9	99.97	1.3E-04	5.8E-04	1.1E-06	95.00	50	3.3E-05	1.4E-04	99.97	9.9E-09	4.3E-08	3,141.6
4. Spray Dryer #1 (Also known as SD-1, Equip. #4)	0.040	99.00	50	6.0	26.2	99.97	1.8E-03	7.9E-03	-	-	-	-	-	-	-	-	883.6
5. Spray Dryer #2 (Also known as SD-2, Equip. #5)	0.022	99.00	50	3.3	14.6	99.97	1.0E-03	4.4E-03	5.0E-05	99.00	50	7.5E-03	3.3E-02	99.97	2.2E-06	9.8E-06	190.9
6. Spray Dryer #3 (Also known as SD-3, Equip. #6)	0.017	99.00	50	2.5	11.1	99.97	7.6E-04	3.3E-03	7.8E-05	99.00	50	1.2E-02	5.1E-02	99.97	3.5E-06	1.5E-05	1,586.5
24. Harrop 1 PZT RTC {Also known as H1.2 or as Harrop 1: H-1(DC-4), for exhaust trap.}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	138.9
25. Harrop 2 RTC {Also known as H2.1 or as Harrop 2: H-2(DC-4), for exhaust trap.}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	897.4
26. Harrop 3 RTC {Also known as 3.2 or as Harrop 3: H-3(DC-4), for exhaust trap.}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	897.4
37. Harrop 5 {Also known as Harrop 5: H-5(DC-4), for exhaust trap.}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	833.6
30. Harrop 6: H-6(DC-4) {Also kwon as H-6 Exhaust Trap 6" Roof}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	833.6
41. Harrop 10: H-10(DC-4) { Also kwon as H-10 Exhaust Trap 6" Roof}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	833.6
42. Harrop 14: H-14(DC-4) {Also known as H-14 Kiln Cooling Unit blower+ Exhaust Trap 6" Roof}	0.0017	0.00	100.0	0.0035	0.015	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100.0	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	833.6
27. PZT Room Heat exhaust (Also known as N-2)	0.0017	0.00	100	0.0035	0.0153	99.97	1.0E-06	4.6E-06	9.1E-07	0.00	100	1.8E-06	8.0E-06	99.97	5.5E-10	2.4E-09	1,205.9
28. OV1	0.086	0.00	100	0.17	0.76	99.97	5.2E-05	2.3E-04	9.7E-06	0.00	100	1.9E-05	8.5E-05	99.97	5.8E-09	2.6E-08	353.4
29. DF3	0.086	0.00	100	0.17	0.76	99.97	5.2E-05	2.3E-04	9.7E-06	0.00	100	1.9E-05	8.5E-05	99.97	5.8E-09	2.6E-08	35.3
32. Multiple Process (Also known as UF24)	0.086	0.00	100	0.17	0.76	99.97	5.2E-05	2.3E-04	9.7E-06	0.00	100	1.9E-05	8.5E-05	99.97	5.8E-09	2.6E-08	3,094.9
				12.9	56.3		0.0039	0.017				0.019	0.084		5.8E-06	2.5E-05	

Table C-3: Emission Calculations for the combination of process exhaust units continuing to discharge to stack FEU-1

Description: This stack will continue to combine the emission from the exhaust unit listed below. This system will continue to use two-stage Farr® 99.99% ultra-high efficiency filtration.

FEU-1 Exhaust Flow :

Max design = 12,000.0 SCF/min

Current use = 10,858.8

90% Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Units:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
13. Midsaw Exhaust (IL1, also known as UF-16)	0.086	0.00	50.0	0.13	0.57	99.99	1.3E-05	5.7E-05	9.7E-06	0.00	50.0	1.5E-05	6.4E-05	99.99	1.5E-09	6.4E-09	7,952.2
34. UF-9	0.017	0.00	50.0	0.025	0.1112	99.99	2.5E-06	1.1E-05	-	-	-	-	-	-	-	-	1,256.6
35. Machine Shop N. Fan (Also known as UF-5)	0.0017	0.00	50.0	0.0026	0.011	99.99	2.6E-07	1.1E-06	9.1E-07	0.00	50.0	1.4E-06	6.0E-06	99.99	1.4E-10	6.0E-10	1,237.5
36. CNC Machines (Also known as UF-15)	0.031	0.00	50.0	0.047	0.2056	99.99	4.7E-06	2.1E-05	1.3E-06	0.00	50.0	1.9E-06	8.4E-06	99.99	1.9E-10	8.4E-10	412.5
				0.20	0.90		2.0E-05	9.0E-05				1.8E-05	7.8E-05		1.8E-09	7.8E-09	

Table C-4: Emission Calculations for the combination of process exhaust units proposed to discharge to re-deployed Stack DC-3

Description: This stack will combine the emissions from the exhaust units listed below. This system will re-employ a ~95.0% efficient existing filtration.

DC-3 Exhaust Flow:

Max design = 20,000.0 SCF/min

Current use = 19,754.2

99% Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Units:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
15. Clean Room Exhaust (UF18) LGS Ventilation	0.086	0.00	50.0	0.13	0.57	95.0	6.5E-03	2.8E-02	-	-	-	-	-	-	-	-	2,300.0
20. EMC kiln Room Vent (Also known as EMC)	0.086	0.00	50.0	0.047	0.21	95.0	2.3E-03	1.0E-02	-	-	-	-	-	-	-	-	1,250.0
22. RF Oven dryer OD-3	0.022	0.00	50.0	0.033	0.15	95.0	1.7E-03	7.3E-03	5.0E-05	0.00	50	7.5E-05	3.3E-04	95.0	3.7E-06	1.6E-05	141.0
23a. RF Oven dryer OD-4	0.022	0.00	50.0	0.033	0.15	95.0	1.7E-03	7.3E-03	5.0E-05	0.00	50	7.5E-05	3.3E-04	95.0	3.7E-06	1.6E-05	706.9
23b. RF Oven dryer OD-4	0.022	0.00	50.0	0.033	0.15	95.00	1.7E-03	7.3E-03	5.0E-05	0.00	50	7.5E-05	3.3E-04	95.0	3.7E-06	1.6E-05	141.0
37. UF-28 (Also known as Harrop 5 heat shroud)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,902.5
33. UF-26	0.031	0.00	50.0	0.047	0.21	0.95	2.3E-03	1.0E-02	1.3E-06	0.00	100	1.3E-06	5.6E-06	95.0	1.3E-07	5.6E-07	5,000.0
24. Harrop-1: H-1(DC-3) {Return Track Cooling inline blower + Kiln Cooling Unit blower}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	634.2
25. Harrop-2: H-2(DC-3) {Return Track Cooling inline blower + Kiln Cooling Unit blower}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	634.2
26. Harrop-3: H-3(DC-3) {Return Track Cooling NC + C}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	634.2
38. Harrop 4: H-4(DC-3) {Heat Shroud + Return Track Cooling NC + C}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	634.2
37. Harrop-5: H-5(DC-3) {Heat Shroud + Return Track Cooling NC + C}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	634.2
30. Harrop 6: H-6 RTC (DC-3) {Existing stack H7.3}	0.0296	0.00	50.0	0.044	0.19	95.0	0.0022	0.0097	3.7E-07	0.00	50.0	5.5E-07	2.4E-06	95.0	2.8E-08	1.2E-07	2,142.0
30. Harrop 6: H-6 RTC-Non Contact (DC-3) {Existing Stack H7.2}	0.0017	0.00	50.0	0.0026	0.011	95.0	1.3E-04	5.7E-04	9.1E-07	0.00	50.0	1.4E-06	6.0E-06	95.0	6.8E-08	3.0E-07	1,731.4
30. Harrop-6: H-6(DC-3) {Heat shroud + Return Track Cooling inline blower + Kiln Cooling Unit blower}	0.0017	0.00	0.0	0.0017	0.0076	1.0	8.7E-05	3.8E-04	0.000	0.00	0.0	0.000	0.000	95.0	4.5E-08	2.0E-07	634.2
31. Harrop-9: H-9(DC-3)	0.0017	0.00	0.0	0.0017	0.0076	1.0	8.7E-05	3.8E-04	0.000	0.00	0.0	0.000	0.000	95.0	4.5E-08	2.0E-07	634.2
				0.37	1.6		0.019	0.082				2.3E-04	1.0E-03		1.2E-05	5.1E-05	

Table C-5: Emission Calculations for the process emissions that continue to discharge to stack DC-2

Description: This stack could combine the emissions from multiple unit(s) including the one listed below. This system will continue to use a ~95.0% efficient existing filtration.

DC-2 Exhaust Flow:

Max design =	20,000.0	SCF/min
Current use =	19,678.9	
	98%	Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Unit:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
2. Dust Collector #2 (RF Foundry East) (Also known as DC-2)	0.122	95.00	50	3.7	16.1	95.0	1.8E-01	8.0E-01	5.9E-05	95.00	50	1.8E-03	7.7E-03	95.00	8.8E-05	3.9E-04	15,155.0
38. Harrop 4: H-4(DC-2) {H-4 Exhaust Trap 6" Roof}	0.0017	95.0	50	0.052	0.23	95.0	0.0026	0.011	9.1E-07	0.95	50	2.7E-05	1.2E-04	0.95	1.4E-06	6.0E-06	2,261.9
31. Harrop 9: H-9(DC-2) {H-9 Exhaust Trap 6" Roof}	0.0017	95.0	50	0.052	0.23	95.0	0.0026	0.011	9.1E-07	0.95	50	2.73E-05	1.28E-06	95.00%	1.36E-06	5.97E-06	2,261.9
				3.8	16.5		0.19	0.83				0.0018	0.0078		9.1E-05	4.0E-04	

Table C-6: Emission Calculations for the process emissions that continue to discharge to stack UF-1

Description: This stack will combine the emissions from multiple unit(s) as shown below.

UF-1 Exhaust Flow:

Max design =	10,000.0	SCF/min (Engineering Estimate)
Current use =	9,452.5	SCF/min
	95%	Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Unit:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
8. UF-1 Raw Material Batching	0.086	99.95%	50	259.2	1135.3	99.95	0.13	0.57	9.7E-06	99.95	50	2.9E-02	1.3E-01	99.95	1.5E-05	6.4E-05	8,664.8
24. Harrop-1: H-1(UF-1)	0.002	99.95%	50	5.2	22.9	99.95%	0.003	0.01	9.1E-07	99.95	50	2.7E-03	1.2E-02	99.95	1.4E-06	6.0E-06	262.6
25. Harrop-2: H-2(UF-1)	0.002	99.95%	50	5.2	22.9	99.95%	0.003	0.01	9.1E-07	99.95	50	2.7E-03	1.2E-02	99.95	1.4E-06	6.0E-06	262.6
26. Harrop-3: H-3(UF-1)	0.002	99.95%	50	5.2	22.9	99.95%	0.003	0.01	9.1E-07	99.95	50	2.7E-03	1.2E-02	99.95	1.4E-06	6.0E-06	262.6
				274.9	1203.9		0.14	0.60				0.037	0.16		1.9E-05	8.17E-05	

Table C-7: Emission Calculations for the process emissions that continue to discharge to stack UF-3

Description: This stack will combine the emissions from multiple unit(s) as shown below.

UF-3 Exhaust Flow:

Max design =	10,000.0	SCF/min (Engineering Estimate)
Current use =	7,453.1	SCF/min
	75%	Usage percentage

	TSP								Lead								
	Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Emission Rate (lb/hr)	Current Emission Control EFF%	SF	Uncontrolled		Control	Controlled		Exhaust Flow
Exhaust Unit:			%	lb/hr	tpy	EFF%	lb/hr	tpy			%	lb/hr	tpy	EFF%	lb/hr	tpy	(SCF/min)
10. UF-3 Raw Material Batching	29.644	99.95%	50	44.5	194.8	99.95	0.022	0.10	2.2E-03	99.95	50	0.0033	0.014	99.95	1.6E-06	7.2E-06	6,750.0
41. Harrop-10: H-10(UF-3)	3.482	99.95%	50	5.2	22.9	99.95	0.0026	0.011	1.8E-03	99.95	50	0.0027	0.012	99.95	1.4E-06	6.0E-06	703.1
				49.7	217.6		0.025	0.11				0.0060	0.026		3.0E-06	1.3E-05	

Table C-8: Modeler's Input- Proposed New and Continuing Existing Process Stacks: Dimensions and Exhaust Temperature Estimates

New Stack	Existing Stacks	Sampled Stack Tested Temperature (°R)	From CTS: Provided Stack Temp (°F)	From CTS: In °R	Average Temperature (°R)	Proposed Stack Diameter (in)	Proposed Stack Above Grade Height (ft)	Discharge Orientation
DC-4	DC-1	**535.0**	78.0	537.7	570.2	20x29 (likely duct stack size based on odd 19"x28.5" fan outlet)	~42 (~3' lower than existing DC-1 in same location)	Up
	SD-1	**625.0**	160.0	619.7				
	SD-2	**599.1**	96.0	555.7				
	SD-3	**611.1**	160.0	619.7				
	H1.2	-	85.0	**544.7**				
	H2.1	-	-	-				
	H3.2	-	72.0	**531.7**				
	H4.1	-	91.0	**550.7**				
	N-2	-	89.0	**548.7**				
	OV-1	-	202.0	**661.7**				
	DF3	-	72.0	**531.7**				
	H7.2	**563.6**	102.0	561.7				
	H7.3	**540.0**	81.0	540.7				
DC-2	DC-2	**548.9**			548.9	28	~42	Up
DC-3	UF-26	-	93.0	**552.7**	541.2	28	~42	Up
	UF-28		82.0	**541.7**				
	UF-27		89.0	**548.7**				
	UF-18		92.0	**551.7**				
	UF-24		78.0	**537.7**				
	OD-4		65.0	**524.7**				
	OD-3		72.0	**531.7**				
FEU-1	UF-9	-	100.0	**559.7**	542.8	32x24	~42	Up
	UF-5		77.0	**536.7**				
	UF-16		72.5	**532.2**				
	UF-15			459.7				
Individual Stacks	UF-1		93.0	**552.7**	552.7	26x29	~42	Up
	UF2	**539.7**	-	539.7	539.7	24" x 32"	~42	Up
	UF3	**549.6**	-	549.6	549.6	27x30	~42	Up
	N1	**541.2**	-	541.2	541.2	60	~50 existing	Up

Table C-9: Modeler's Input- Proposed Controlled Process Emission Rates and Exhaust Flow Rate

Combo Stack ID	TSP		Lead		Exhaust Flow	NO_X		CO		VOC		SO_2		Diameter (ft)	Area (ft^2)	Stack Velocity (ft/s)
	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	(SCF/min)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)			
UF-1	0.14	0.60	1.87E-05	8.17E-05	9,452.5	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.58	5.24	30.09
UF-2	0.13	0.57	1.46E-05	6.4E-05	4,676.9	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.61	5.33	14.62
UF-3	0.025	0.11	3.0E-06	1.3E-05	7,453.1	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.68	5.63	22.08
N1	0.049	0.22	3.3E-05	1.4E-04	24,850.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.9	6.2	0.0E+00	0.0E+00	5.00	19.63	21.09
DC-4	0.0039	0.017	5.8E-06	2.5E-05	15,760.1	1.5E-02	6.6E-02	1.4E-02	6.1E-02	9.3E-04	4.1E-03	2.2E-03	9.6E-03	2.26	4.03	65.21
DC-2	0.19	0.83	9.1E-05	4.0E-04	19,678.9	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.33	4.28	76.70
DC-3	0.019	0.082	1.2E-05	5.1E-05	19,754.2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.33	4.28	77.00
FEU-1	2.0E-05	9.0E-05	1.8E-09	7.8E-09	10,446.3	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.61	5.33	32.64

Table C-10: Uncontrolled Process Emission Rates for the Eight (8) Modeled Process Stacks

Combo Stack ID	TSP		Lead		NO_X		CO		VOC		SO_2	
	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)
UF-1	274.9	1203.9	0.0018	0.0078	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
UF-2	259.2	1135.3	0.0291	0.1276	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
UF-3	49.7	217.6	0.025	0.11	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N1	0.049	0.22	3.3E-05	1.44E-04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9	6.2	0.0E+00	0.0E+00
DC-4	12.86	56.3	0.019	0.084	1.50E-02	0.0657	0.014	0.061	0.00093	0.0041	0.0022	0.0096
DC-2	3.77	16.5	1.8E-03	7.8E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
DC-3	0.37	1.6	2.3E-04	1.0E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FEU-1	2.0E-01	0.90	1.8E-05	7.82E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Table C-11: Total Proposed Process and Non-Process Emissions Rates - Uncontrolled and Controlled

	TSP		Lead		NO_X		CO		VOC		SO_2		Combust PM_{10}		Combust $PM_{2.5}$		HAP		Ag		
	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	
Uncontrolled	601.0	2632.5	0.094	0.41	1.8	6.3	1.6	5.4	5.8	19.0	0.24	0.81	0.14	0.47	0.14	0.47	0.51	2.2	0.0029	0.0126	Uncontrolled & Controlled
Controlled	0.55	2.4	0.00018	0.00078																	

Table C-12: Existing ATC Permit Limits and the Proposed Reductions of Total of Process and Non-Process Emissions in the Permit Modification Application

TSP		Lead		NO_X		CO		VOC		SO_2		Combust PM_{10}		Combust $PM_{2.5}$		
Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	
3.86	5.72	0.1510	0.373	12.91	11.03	5.8	14.2	9.77	31.06	0.811	0.352	3.86	5.72	3.86	5.72	Existing ATC
3.31	3.30	0.1508	0.372	11.06	4.73	4.23	8.84	3.93	12.06	0.57	-0.45	3.72	5.25	3.72	5.25	Delta: ATC - Proposed emission reduction
											Increase					

Table C-13: Comparison of Proposed Total of Process and Non-Process Controlled Emission Rates vs CTS's 2015 and 2014 Air Emission Inventories (AEIs)

TSP		Lead		NO_X		CO		VOC		SO_2		
Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	
0.3203	0.2008	0.01070	0.00830	0.2230	0.4775	1.1820	0.9900	1.6445	3.5	0.0010	0.0030	2014
0.3163	0.1887	0.00870	0.00830	0.2230	0.4773	1.1820	0.9600	1.2807	2.8	0.0010	0.0030	2015
0.3203	**0.2008**	**0.0107**	**0.0083**	**0.2230**	**0.4775**	**1.1820**	**0.9900**	**1.6445**	**3.5325**	**0.0010**	**0.0030**	Max reported emission rate
-0.2325	-2.2203	0.0105	0.0075	-1.6236	-5.8250	-0.3852	-4.3745	-4.1923	-15.4706	-0.2369	-0.8024	Delta: Max Reported - Proposed Controlled Emissions

Table C-14: Total of Proposed Non-Process Emissions Rates from All Three (3) CTS-related Comfort Heating Boilers

NO_X		CO		VOC		SO_2		Combust PM_{10}		Combust $PM_{2.5}$		HAP	
Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)	Rate (lb/hr)	Rate (tpy)
1.7	5.5	1.4	4.6	0.089	0.29	0.21	0.68	0.12	0.40	0.12	0.40	0.042	0.14

Table C-15: Detailed Proposed Uncontrolled Emission Rates per Process Emission Unit

Process Equipment Unit	Carbon Monoxide (CO)		Oxides of Nitrogen (NOx)		Nonmethane Hydrocarbons NMHC (VOCs)		Oxides of Sulfur (SOx)		Total Suspended Particulate Matter (TSP)		Lead (Pb)		Silver (Ag)		HAP (Excluding Lead)	
	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr
7. Facility Fume Hood Ventilation (aka, Silver Electroding or Hood Ventilation {N}) (Also known as Main Exhaust –Solvent Stack, N-1)	-	-	-	-	2.9	6.2	-	-	0.049	0.22	3.3E-05	0.00014	0.0029	0.013	0.10	0.43
8. UF-1 Raw Material Batching. Refer to Table C-6 for a list of the units to be connected to this discharge point.	-	-	-	-	-	-	-	-	274.9	1203.9	0.037	0.16	-	-	-	-
9. UF-2 Raw Material Batching	-	-	-	-	-	-	-	-	259.2	1135.3	0.029	0.13	-	-	-	-
10. UF-3 Raw Material Batching + Harrop-10	-	-	-	-	-	-	-	-	49.7	217.6	0.0060	0.026	-	-	-	-
21. Solvent Storage Shed (Also known as EF-1)	-	-	-	-	2.8	12.4	-	-	-	-	-	-	-	-	0.40	1.7
40. Stack DC-4 Description: This stack will combine the emission from the exhaust units listed below. Although this system will use a two stage "green" Farr® HEPA filter with a 99.97% efficiency, the uncontrolled emissions are presented in this table. Refer to Table C-2 for the list of units that are connected to this dust collector.	0.014	0.061	0.015	0.066	0.00093	0.0041	0.0022	0.010	12.9	56.3	0.019	0.084	-	-	-	-
39. Stack FEU-1 Description: This stack will combine the emission from the exhaust units listed below. Although this system will use a ultra-high efficiency HEPA filter, 99.99% efficiency, the uncontrolled emissions are presented in this table. Refer to Table C-3 for the list of units that are connected to this unit.	-	-	-	-	-	-	-	-	0.20	0.90	1.8E-05	7.8E-05	-	-	-	-
2. Stack DC-2 Description: This stack will handle the emissions from the exhaust unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Refer to Table C-5 for the list of units that are connected to this unit.	-	-	-	-	-	-	-	-	3.8	16.5	0.0018	0.0078	-	-	-	-
3. Stack DC-3 Description: This stack will combine the emission from the exhaust units listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Refer to Table C-4 for the list of units that are connected to this unit.	-	-	-	-	-	-	-	-	0.37	1.6	0.00023	0.0010	-	-	-	-
Sub-Total =	**0.014**	**0.061**	**0.015**	**0.066**	**5.7**	**18.7**	**0.0022**	**0.010**	**601.0**	**2632.5**	**0.094**	**0.41**	**0.0029**	**0.013**	**0.50**	**2.2**

Table C-15: Detailed Proposed Uncontrolled Emission Rates per Non-Process Emission Unit (cont.)

Process Equipment Unit	Carbon Monoxide (CO)		Oxides of Nitrogen (NOx)		Nonmethane Hydrocarbons NMHC (VOCs)		Oxides of Sulfur (SOx)		Total Suspended Particulate Matter (TSP)		Lead (Pb)		Silver (Ag)		HAP (Excluding Lead)	
	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr
11a. Boiler (also known as B1 or PH-1)	0.71	3.1	0.84	3.7	0.043	0.19	0.10	0.45	0.060	0.26	-	-	-	-	0.018	0.081
11b. Boiler	0.34	0.75	0.41	0.89	0.023	0.050	0.054	0.12	0.032	0.069	-	-	-	-	0.0049	0.022
11c. Boiler	0.34	0.75	0.41	0.89	0.023	0.050	0.054	0.12	0.032	0.069	-	-	-	-	0.0049	0.022
101. HW1 Nat Gas Water Heater	0.036	0.16	0.039	0.17	0.0024	0.011	0.0057	0.025	0.0033	0.015	-	-	-	-	0.0058	0.025
102. HW2 Nat Gas Water Heater	0.036	0.16	0.039	0.17	0.0024	0.011	0.0057	0.025	0.0033	0.015	-	-	-	-	0.0058	0.025
103. UH-2 REZNOR Heater	0.045	0.20	0.049	0.21	0.0030	0.013	0.0071	0.031	0.0042	0.018	-	-	-	-	0.0072	0.031
104. UH-1 REZNOR Heater	0.045	0.20	0.049	0.21	0.0030	0.013	0.0071	0.031	0.0042	0.018	-	-	-	-	0.0072	0.031
Sub-Total =	**1.6**	**5.3**	**1.8**	**6.2**	**0.10**	**0.34**	**0.24**	**0.80**	**0.14**	**0.47**	**0.0**	**0.0**	**0.0**	**0.0**	**0.054**	**0.24**
Process + Combustion Units =	**1.6**	**5.4**	**1.8**	**6.3**	**5.8**	**19.0**	**0.24**	**0.81**	**601.2**	**2633.0**	**0.094**	**0.41**	**2.9E-03**	**1.3E-02**	**0.55**	**2.4**

Table C-16: Detailed Proposed Controlled Emission Rates per Process Emission Unit

Process Equipment Unit	Carbon Monoxide (CO)		Oxides of Nitrogen (NOx)		Nonmethane Hydrocarbons NMHC (VOCs)		Oxides of Sulfur (SOx)		Total Suspended Particulate Matter (TSP)		Lead (Pb)		Silver (Ag)		HAP (Excluding Lead)	
	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr
7. Facility Fume Hood Ventilation (aka, Silver Electroding or Hood Ventilation {N}) (Also known as Main Exhaust –Solvent Stack, N-1)	-	-	-	-	2.9	6.2	-	-	0.049	0.22	3.3E-05	1.4E-04	0.0029	0.013	0.10	0.43
8. UF-1 Raw Material Batching {Refer to Table C-6 for a list of the units to be connected to this discharge point.}	-	-	-	-	-	-	-	-	0.14	0.60	1.9E-05	8.2E-05	-	-	-	-
9. UF-2 Raw Material Batching	-	-	-	-	-	-	-	-	0.13	0.57	1.5E-05	6.4E-05	-	-	-	-
10. UF-3 Raw Material Batching + Harrop-10	-	-	-	-	-	-	-	-	0.025	0.11	3.0E-06	1.3E-05	-	-	-	-
21. Solvent Storage Shed (Also known as EF-1)	-	-	-	-	2.8	12.4	-	-	-	-	-	-	-	-	0.40	1.7
40. Stack DC-4 Description: This stack will combine the emission from the unit listed below. Although this system will use a two stage "green" Farr® HEPA filter with a 99.97% efficiency, the uncontrolled emissions are presented in this table.Refer to Table C-2 for the list of units that are connected to this dust collector.	0.014	0.061	0.015	0.066	0.00093	0.0041	0.0022	0.0096	0.0039	0.017	5.8E-06	2.5E-05	-	-	-	-
39. Stack FEU-1 Description: This stack will combine the emission from the unit listed below. Although this system will use a ultra-high efficiency HEPA filter, 99.99% efficiency, the uncontrolled emissions are presented in this table. Refer to Table C-3 for the list of units that are connected to this unit.	-	-	-	-	-	-	-	-	2.0E-05	9.0E-05	1.8E-09	7.8E-09	-	-	-	-
2. Stack DC-2 Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Refer to Table C-5 for the list of units that are connected to this unit.	-	-	-	-	0.00	0.00	-	-	0.19	0.83	9.1E-05	4.0E-04	-	-	-	-
3. Stack DC-3 Description: This stack will combine the emission from the unit listed below. Although this system will use a 95.0% efficiency filter the uncontrolled emissions are presented in this table. Refer to Table C-4 for the list of units that are connected to this unit.	-	-	-	-	0.00	0.00	-	-	0.019	0.082	1.2E-05	5.1E-05	-	-	-	-
Sub-Total =	**0.014**	**0.061**	**0.015**	**0.066**	**5.7**	**18.7**	**0.0022**	**0.010**	**0.55**	**2.4**	**1.8E-04**	**7.8E-04**	**0.0029**	**0.013**	**0.50**	**2.2**

Table C-16: Detailed Proposed Controlled Emission Rates per Non Process Emission Unit (cont.)

Process Equipment Unit	Carbon Monoxide (CO)		Oxides of Nitrogen (NOx)		Nonmethane Hydrocarbons NMHC (VOCs)		Oxides of Sulfur (SOx)		Total Suspended Particulate Matter (TSP)		Lead (Pb)		Silver (Ag)		HAP (Excluding Lead)	
	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr	Lbs/hr	tons/yr
11a. Boiler (also known as B1 or PH-1)	0.71	3.1	0.84	3.7	0.043	0.19	0.10	0.45	0.060	0.26	-	-	-	-	0.018	0.081
11b. Boiler	0.34	0.75	0.41	0.89	0.023	0.050	0.054	0.12	0.032	0.069	-	-	-	-	0.0049	0.022
11c. Boiler	0.34	0.75	0.41	0.89	0.023	0.050	0.054	0.12	0.032	0.069	-	-	-	-	0.0049	0.022
101. HW1 Nat Gas Water Heater	0.036	0.16	0.039	0.17	0.0024	0.011	0.0057	0.025	0.0033	0.015	-	-	-	-	0.0058	0.025
102. HW2 Nat Gas Water Heater	0.036	0.16	0.039	0.17	0.0024	0.011	0.0057	0.025	0.0033	0.015	-	-	-	-	0.0058	0.025
103. UH-2 REZNOR Heater	0.045	0.20	0.049	0.21	0.0030	0.013	0.0071	0.031	0.0042	0.018	-	-	-	-	0.0072	0.031
104. UH-1 REZNOR Heater	0.045	0.20	0.049	0.21	0.0030	0.013	0.0071	0.031	0.0042	0.018	-	-	-	-	0.0072	0.031
Sub-Total =	**1.6**	**5.3**	**1.8**	**6.2**	**0.1**	**0.3**	**0.24**	**0.8**	**0.14**	**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.054**	**0.24**
Process + Combustion Units =	**1.6**	**5.4**	**1.8**	**6.3**	**5.8**	**19.0**	**0.24**	**0.81**	**0.69**	**2.9**	**1.8E-04**	**7.8E-04**	**2.9E-03**	**1.3E-02**	**0.55**	**2.4**

Spray Dryer #1 (Spray Dryer #2 is electric heated)

Emission Unit: Dryer #1
Stack Number:

Description

Unit Description: Spray Dryer
Source Description: Natural gas-fired
Manufacturer: Nitro-Atomizer
Model: S-12-5N-GCB3
Serial Number:

Fuel Consumption

Parameters	Value	Unit	Note
Dryer Burner	0.067	MMBtu/hr	Mfg data
Fuel Heat Value	1000	Btu/scf	Nominal, natural gas
Hourly fuel usage	67	scf/hr	Input heat rate / fuel heat value
	0.000067	MMscf/hr	
Annual fuel usage	0.59	MMscf/yr	8760 actual hrs/yr operation

Emission Rates

	NOx	CO	VOC	SO_2[1]	TSP[2]	PM10[2]	PM2.5[2]	HAPs[3]	CO_2	CH_4	N_2O	CO_2e[4]	Units	Notes
Natural Gas Combustion	**100**	**84**											lb/10^6 scf	*AP-42 Table 1.4-1 - natural gas*
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	6.6E-03	**5.5E-03**											lb/hr	
				5									grains S/100 scf	Fuel sulfur content
				9.6E-04									lb/hr	Fuel Consumption * sulfur content
			5.5		7.6	7.6	7.6						lb/MMscf	*AP-42 Table 1.4-2 - natural gas*
			3.7E-04		**5.1E-04**	**5.1E-04**	**5.1E-04**						lb/hr	lb/MMscf * MMscf/hr
									53.06	0.0010	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	0.0022	2.2E-04		lb/MMBtu	
	0	*10*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Total Emission Rates	6.6E-03	6.1E-03	4.1E-04	9.6E-04	5.6E-04	5.6E-04	5.6E-04	0.0002	7.8	1.5E-04	1.5E-05	7.8	lb/hr	
	2.9E-02	2.7E-02	1.8E-03	4.2E-03	2.5E-03	2.5E-03	2.5E-03	0.0008	34.3	6.5E-04	6.5E-05	34.4	tpy	lb/hr * Operated hrs/yr / 2000lb/ton

Controlled Emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft.
5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2

[2] Natural Gas Combustion: TSP = PM_{10} = $PM_{2.5}$

[3] HAPs estimated with GRI-HAPCalc

[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.

CH_4 GWP = 25

N_2O GWP = 298

HAPs Components[3]

Component	ton/yr	
Formaldehyde	0.0000	
Methanol	0.0001	
Acetaldehyde	0.0001	
Benzene	0.0000	
Toluene	0.0000	
Xylenes (m,p,o)	0.0000	
2,2,4-Trimethylpentane	0.0000	
Napthalene	0.0000	
Biphenyl	0.0000	
n-Hexane	0.0005	
Lead	0.0000	
Total =	0.0007	ton/yr
	0.00016	lbs/hr

Spray Dryer #3

Emission Unit: Dryer # 3
Stack Number:

Description

Unit Description: Spray Dryer
Source Description: Natural gas-fired
Manufacturer: Nitro-Atomizer
Model: SD50R
Serial Number:

Fuel Consumption

Parameters	Value	Unit	Note
Dryer Burner	0.086	MMBtu/hr	Mfg data
Fuel Heat Value	1000	Btu/scf	Nominal, natural gas
Hourly fuel usage	86	scf/hr	Input heat rate / fuel heat value
	0.000086	MMscf/hr	
Annual fuel usage	0.75	MMscf/yr	8760 actual hrs/yr operation

Emission Rates

	NOx	CO	VOC	SO_2[1]	TSP[2]	PM10 [2]	PM2.5 [2]	HAPs[3]	CO_2	CH_4	N_2O	CO_2e [4]	Units	Notes
Natural Gas Combustion	**100**	**84**											lb/10^6 scf	*AP-42 Table 1.4-1 - natural gas*
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	8.4E-03	**7.1E-03**											lb/hr	
				5									grains S/100 scf	Fuel sulfur content
				1.2E-03									lb/hr	Fuel Consumption * sulfur content
			5.5		7.6	7.6	7.6						lb/MMscf	*AP-42 Table 1.4-2 - natural gas*
			4.7E-04		**6.5E-04**	**6.5E-04**	**6.5E-04**						lb/hr	lb/MMscf * MMscf/hr
									53.06	0.0010	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	0.0022	2.2E-04		lb/MMBtu	
	0	*10*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Total Emission Rates	8.4E-03	7.8E-03	5.2E-04	1.2E-03	7.2E-04	7.2E-04	7.2E-04	0.00025	10.1	1.9E-04	1.9E-05	10.1	lb/hr	
	3.7E-02	3.4E-02	2.3E-03	5.4E-03	3.1E-03	3.1E-03	3.1E-03	0.0011	44.1	8.3E-04	8.3E-05	44.1	tpy	lb/hr * Operated hrs/yr / 2000lb/ton

Controlled Emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft
5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2

[2] Natural Gas Combustion: TSP = PM_{10} = $PM_{2.5}$

[3] HAPs estimated with GRI-HAPCalc

[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.

CH_4 GWP = 25

N_2O GWP = 298

HAPs Components[5]

Component	ton/yr	
Formaldehyde	0.0000	
Methanol	0.0002	
Acetaldehyde	0.0000	
Benzene	0.0000	
Toluene	0.0000	
Xylenes (m,p,o)	0.0000	
2,2,4-Trimethylpentane	0.0000	
Napthalene	0.0000	
Biphenyl	0.0000	
n-Hexane	0.0007	
Lead	0.0000	
Total =	0.0010	ton/yr
	0.00023	lbs/hr

Hot Water Heater

Emission Unit: HW-1 and HW-2
Stack Number:

Description

Unit Description: Hot Water Heater
Source Description: Natural gas-fired
Manufacturer:
Model:
Serial Number:

Fuel Consumption

Parameters	Value	Unit	Note
Dryer Burner	0.399	MMBtu/hr	Mfg data
Fuel Heat Value	1000	Btu/scf	Nominal, natural gas
Hourly fuel usage	399	scf/hr	Input heat rate / fuel heat value
	0.000	MMscf/hr	
Annual fuel usage	3.50	MMscf/yr	8760 actual hrs/yr operation

Emission Rates

	NOx	CO	VOC	SO_2 [1]	TSP [2]	PM10 [2]	PM2.5 [2]	HAPs [3]	CO_2	CH_4	N_2O	CO_2e [4]	Units	Notes
Natural Gas Combustion	**100**	**84**											lb/10^6 scf	*AP-42 Table 1.4-1 - natural gas*
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	3.9E-02	**3.3E-02**											lb/hr	
				5									grains S/100 scf	Fuel sulfur content
				5.7E-03									lb/hr	Fuel Consumption * sulfur content
			5.5		7.6	7.6	7.6						lb/MMscf	*AP-42 Table 1.4-2 - natural gas*
			2.2E-03		**3.0E-03**	**3.0E-03**	**3.0E-03**						lb/hr	lb/MMscf * MMscf/hr
									53.06	0.0010	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	0.0022	2.2E-04		lb/MMBtu	
	0	*10*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Total Emission Rates	3.9E-02	3.6E-02	2.4E-03	5.7E-03	3.3E-03	3.3E-03	3.3E-03	0.0064	46.7	8.8E-04	8.8E-05	46.7	lb/hr	
	1.7E-01	1.6E-01	1.1E-02	2.5E-02	1.5E-02	1.5E-02	1.5E-02	0.0278	204.4	3.9E-03	3.9E-04	204.6	tpy	lb/hr * Operated hrs/yr / 2000lb/ton

Controlled Emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft
5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2
[2] Natural Gas Combustion: TSP = PM_{10} = $PM_{2.5}$
[3] HAPs estimated with GRI-HAPCalc
[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.
CH_4 GWP = 25
N_2O GWP = 298

HAPs Components [3]

Component	ton/yr	
Formaldehyde	0.0015	
Methanol	0.0017	
Acetaldehyde	0.0013	
Benzene	0.0013	
Toluene	0.0018	
Xylenes (m,p,o)	0.0023	
2,2,4-Trimethylpentane	0.0050	
Napthalene	0.0000	
Styrene	0.0036	
n-Hexane	0.0000	
Lead	0.0000	
Total =	0.025	ton/yr
	0.0058	lbs/hr

REZNOR Heater

Emission Unit: **UH-1 and UH-2**
Stack Number:

Description

Unit Description: Space Heater
Source Description: Natural gas-fired
Manufacturer:
Model:
Serial Number:

Fuel Consumption

Parameters	Value	Unit	Note
Dyer Burner	0.5	MMBtu/hr	Mfg data
Fuel Heat Value	1000	Btu/scf	Nominal, natural gas
Hourly fuel usage	500	scf/hr	Input heat rate / fuel heat value
	0.001	MMscf/hr	
Annual fuel usage	4.38	MMscf/yr	8760 actual hrs/yr operation

Emission Rates

	NOx	CO	VOC	SO_2[1]	TSP[2]	PM10[2]	PM2.5[2]	HAPs[3]	CO_2	CH_4	N_2O	CO_2e[4]	Units	Notes
Natural Gas Combustion	**100**	**84**											lb/10^6 scf	*AP-42 Table 1.4-1 - natural gas*
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	4.9E-02	**4.1E-02**											lb/hr	
				5									grains S/100 scf	Fuel sulfur content
				7.1E-03									lb/hr	Fuel Consumption * sulfur content
			5.5		7.6	7.6	7.6						lb/MMscf	*AP-42 Table 1.4-2 - natural gas*
			2.8E-03		**3.8E-03**	**3.8E-03**	**3.8E-03**						lb/hr	lb/MMscf * MMscf/hr
									53.06	0.0010	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	0.0022	2.2E-04		lb/MMBtu	
	0	*10*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Total Emission Rates	4.9E-02	4.5E-02	3.0E-03	7.1E-03	4.2E-03	4.2E-03	4.2E-03	0.0079	58.5	1.1E-03	1.1E-04	58.5	lb/hr	
	2.1E-01	2.0E-01	1.3E-02	3.1E-02	1.8E-02	1.8E-02	1.8E-02	0.0345	256.2	4.8E-03	4.8E-04	256.4	tpy	lb/hr * Operated hrs/yr / 2000lb/ton

Controlled Emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft
5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2
[2] Natural Gas Combustion: TSP = PM_{10} = $PM_{2.5}$
[3] HAPs estimated with GRI-HAPCalc
[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.
CH_4 GWP = 25
N_2O GWP = 298

HAPs Components[3]

Component	ton/yr	
Formaldehyde	0.0018	
Methanol	0.0021	
Acetaldehyde	0.0016	
Benzene	0.0016	
Toluene	0.0022	
Xylenes (m,p,o)	0.0029	
2,2,4-Trimethylpentane	0.0062	
Napthalene	0.0000	
Biphenyl	0.0000	
n-Hexane	0.0031	
Lead	0.0000	
Total =	0.031	ton/yr
	0.0072	lbs/hr

Boiler

Emission Unit: Unit 11a
Stack Number:

Description

Manufacturer: Peerless
Model: 211-35-WP-1
Fuel: Natural gas
Serial Number: 211-6534

Fuel Consumption

Parameters	Value	Unit	Note
Input heat rate	7.1	MMBtu/hr	Mfg data
Fuel heat value	1000	Btu/scf	Nominal, natural gas
Fuel rate	7140	Scf/hr	Input heat rate / fuel heat value
	0.0071	MMscf/hr	
	8760	hours per year	operation
Annual fuel usage	62.5	MMscf/yr	8760 actual hrs/yr operation

Emission Rates

	NOx	CO	VOC	SO_2[1]	TSP[2]	PM-10[2]	PM-2.5[2]	HAPs[3]	CO_2	CH_4	N_2O	CO_2e[4]	Units	Note
Emission Factors	100	84	5.5		7.6	7.6	7.6						lb/MMscf	AP-42 Tables 1.4-1 and 1.4-2 (7/98)
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	0.70	0.59	0.039		0.054	0.054	0.054						lb/hr	Unit emissions*Input heat rate
				0.10									lb/hr	Fuel Consumption * sulfur content
									53.1	1.0E-03	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	2.2E-03	2.2E-04		lb/MMBtu	
	20	*20*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Emission Rates	0.84	0.71	0.043	0.10	0.060	0.060	0.060	0.020	835.2	0.016	0.0016	836.1	lb/hr	
	3.7	3.1	0.19	0.45	0.26	0.26	0.26	0.089	3,658.2	0.07	0.007	3,662.0	tpy	lb/hr * 8760 hrs/yr / 2000lb/ton

Controlled emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft
5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2

[2] Natural Gas Combustion: TSP = PM10 = PM2.5

[3] HAPs estimated with GRI-HAPCalc

[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.

CH_4 GWP = 25

N_2O GWP = 298

HAPs Components[3]

Component	ton/yr
Formaldehyde	0.0023
Methanol	0.0135
Acetaldehyde	0.009
Benzene	0.0001
Toluene	0.0001
Xylenes (m,p,o)	0.0000
2,2,4-Trimethylpentane	0.0010
Napthalene	0.0000
Biphenyl	0.0000
n-Hexane	0.0549
Lead	0.0000
Total =	0.081 ton/yr
	0.018 lbs/hr

Boiler

Emission Unit: Unit 11b and 11c
Stack Number:

Description

Manufacturer: Peerless
Model: 211A-19-WP-1
Fuel: Natural gas
11b Serial Number: 211A-5114-0990
11c Serial Number: 211A-5714-0990

Fuel Consumption

Parameters	Value	Unit	Note
Input heat rate	3.8	MMBtu/hr	Mfg data
Fuel heat value	1000	Btu/scf	Nominal, natural gas
Fuel rate	3780	Scf/hr	Input heat rate / fuel heat value
	0.0038	MMscf/hr	
	4380	hours per year	operation
Annual fuel usage	16.6	MMscf/yr	

Emission Rates

	NOx	CO	VOC	SO_2[1]	TSP[2]	PM-10[2]	PM-2.5[2]	HAPs[3]	CO_2	CH_4	N_2O	CO_2e[4]	Units	Note
Emission Factors	100	84	5.5		7.6	7.6	7.6						lb/MMscf	AP-42 Tables 1.4-1 and 1.4-2 (7/98)
	0.098	0.082											lb/MMBtu	To covert from lb/10^6 to lb/MMBtu, devide by 1,020.
	0.37	0.31	0.021		0.029	0.029	0.029						lb/hr	Unit emissions*Input heat rate
				0.05									lb/hr	Fuel Consumption * sulfur content
									53.1	1.0E-03	1.0E-04		kg/MMBtu	Table C-1 and C-2 of 40 CFR Part 98
									117.0	2.2E-03	2.2E-04		lb/MMBtu	
	10	*10*	*10*	*0*	*10*	*10*	*10*	*10*					%	Safety Factor
Emission Rates	0.41	0.34	0.023	0.05	0.032	0.032	0.032	0.011	442.2	0.008	0.0008	442.6	lb/hr	
	0.89	0.75	0.05	0.12	0.069	0.069	0.069	0.024	1,936.7	0.04	0.004	1,938.7	tpy	lb/hr * 8760 hrs/yr / 2000lb/ton

Controlled emissions same as Uncontrolled

[1] SO_2 emissions based on fuel consumption and fuel sulfur content of 5 grains of sulfur per 100 standard cubic ft

5 gr S/100 scf * fuel scf/hr * 1 lb/7000 gr * 64 lb SO_2/32 lb S = lb/hr SO_2

[2] Natural Gas Combustion: TSP = PM10 = PM2.5

[3] HAPs estimated with GRI-HAPCalc

[4] Global Warming Potentials (GWP) are from Table A-1 of the EPA GHG MRR under 40 CFR Part 98.

CH_4 GWP = 25

N_2O GWP = 298

HAPs Components[3]

Component	ton/yr	
Formaldehyde	0.0006	
Methanol	0.0036	
Acetaldehyde	0.0024	
Benzene	0.0000	
Toluene	0.0000	
Xylenes (m,p,o)	0.0000	
2,2,4-Trimethylpentane	0.0003	
Napthalene	0.0000	
Biphenyl	0.0000	
n-Hexane	0.0146	
Lead	0.0000	
Total =	0.022	ton/yr
	0.0049	lbs/hr

Chemical Purchasing & Storage Solvents, VOCs & HAPs (based on recent AEIs)

Material	Composition	Weight Percent	2014 Mixture	2014 Total	SF	Estimated in lbs VOC	Estimated in lbs HAP	
Methanol	Methanol	100	2995	2995		2995	2995	
Xylene	Xylene	100	73	73		73	73	
Isopropyl Alcohol (IPA)	Isopropyl Alcohol	100	8292	8292		8292		
IPAL	IPA	60	433			433		
	Toluene	32	231			231	231	
	Methyl isobutyl ketone (MIBK)	2	14			14	14	
	Total =	94	678	678				
Videojet Ink	Methyl ethyl ketone (MEK)	50	8			8	0	
	Ink	35	5			0	0	
	Others	15	0			0	0	
	Total =	100	13	13				
Videojet Makeup Fluid	Methyl ethyl ketone (MEK)	60	180			180	0	
	Methanol	40	120			120	120	
	Total =	100	300	300				
Silver Conductor Holecoat	Silver (Ag - refer to Stack Test)	*64*				0	0	
	Inert Material					0	0	
	Xylene	30	13			13	13	
	Ethyl Benzene	5	2			2	2	
	Misc Solvents	1	1			1	1	
	Others	100	16	16				
Silver Conductor HIVOC Spray	Silver (Ag - refer to Stack Test)	*85*				0	0	
	Inert Material					0	0	
	Terpineol	14	20			20	0	
	Misc Solvents	1	2			2	2	
	Others	100	22					
Silver - 7314	Silver (Ag - refer to Stack Test)	*79*				0	0	
	Inert Material					0	0	
	Xylene	10	2			2	2	
	Pine Oil	10	2			2	2	
	Misc Solvents	1	0			0	0	
	Others	100	4					
Silver HPZT Ceronic AG 918	Silver (Ag - refer to Stack Test)	*79*				0	0	
	Inert Material					0	0	
	Xylene	10	4			4	4	
	Pine Oil	10	4			4	4	
	Misc Solvents	1	1			1	1	
	Others	100	9					
Silver HPZT Ceronic AG 918A	Silver (Ag - refer to Stack Test)	79				0	0	
	Inert Material					0	0	
	Xylene	10	0			0	0	
	Pine Oil	10	0			0	0	
	Misc Solvents	1	0			0	0	
	Others	100	0			0	0	
Silver - HPZT AG 921-S	Silver (Ag - refer to Stack Test)	*79*				0	0	
	Inert Material					0	0	
	Xylene	10	12			12	12	
	Pine Oil	10	12			12	12	
	Misc Solvents	1	1			1	1	
	Others	100	25					
						12,422.0	3,489.0	lbs/year
						1.4	0.40	lbs/hr
						6.2	1.7	tons/year

Hazardous Air Pollutants (HAPs) Emissions (additional based on recent purchasing records)

Material	Composition	%	2015 Purchase (gal)	Density (lb/gal)	2015 Purchase (lb)	HAP content	Emissions[1] (lb/yr)	Emissions (lb/hr)	Emissions (tpy)
Methanol									
Methanol	Methanol	100%	-	-	1497	100%	748.5	0.085	0.37
Videojet Makeup Fluid	Methanol	40%	-	-	450	40%	90	0.010	0.045
	MEK	60%	-	-	-	-	-	-	-
						Sub Total	838.5	0.096	0.42
Ethylene Glycol									
Polyethylene Glycol 200 Binder	Ethylene Glycol	1%	-	-	3090	1%	15.5	0.0018	0.0077
	Diethylene Glycol	4%	-	-	-	-	-	-	-
	Polyethylene Glycol	94%	-	-	-	-	-	-	-
						Sub Total	15.5	0.0018	0.0077
Xylene									
Dupont Silver Paste 7307J Holecoat	Xylene	30%	-	-	79.4	30%	1.2	0.00014	0.00060
	Silver	60%	-	-	-	-	-	-	-
	Glass	5%	-	-	-	-	-	-	-
	Ethyl Benzene	5%	-	-	-	-	-	-	-
	Other Solvents	1%	-	-	-	-	-	-	-
Dupont Silver Paste 7314	Xylene	10%	-	-	22.1	10%	0.11	1.3E-05	5.5E-05
	Silver	60%	-	-	-	-	-	-	-
	Glass	5%	-	-	-	-	-	-	-
	Pine Oil	10%	-	-	-	-	-	-	-
	Misc. Solvents	1%	-	-	-	-	-	-	-
						Sub Total	1.3	1.5E-04	6.5E-04
						Grand Total	**855.3**	**0.10**	**0.43**

[1] Assume evaporation rate of 50% for liquids
5% for solids

Toxic Air Pollutants (TAPs) Emissions (based on recent purchasing records)

Material	Composition	%	2015 Purchase[1] (gal)	Density (lb/gal)	2015 Purchase[1] (lb)	TAP content	Vapor Pressure (mmHg)	Evaporation Rate[2]	Emissions[2] (lb/yr)	Emissions (lb/hr)	Emissions (tpy)	TAP limit (lb/hr)	Emissions > TAP Limit?
Sulfuric Acid	Sulfuric Acid	65%	2090	12.6	26317.3	65%	0.001	1%	171.1	0.020	0.086	0.0667	No
Hydrogen Peroxide 30%	Hydrogen Peroxide[3]	30%	1155	9.45	10914.8	30%	25	100%	3274.4	**0.37**	1.64	**0.10**	Yes
Hydrogen Bromide													
Hydrobromic Acid 48%	Hydrogen bromide	48%	0.7925	12.5	9.9	48%	8	32%	1.5	1.7E-04	7.6E-04	0.67	No
Potassium Hydroxide													
AZ 421K Developer	Potassium Hydroxide	2%	3130	8.40	26280.6	2%	2.5	10%	52.6	0.006	0.03	0.133	No
	Water	95%	-	-	-	-	-	-	-	-	-	-	
Nitric Acid													
Chrome Etch	Nitric Acid	8.5%	207	8.65	1790.6	8.5%	48	100%	152.2	0.017	0.076	0.333	No
	Ceric ammonium nitrate	20.0%	-	-	-	-	-	-	-	-	-	-	
Iodine													
Gold Etch	Iodine	2%	4	10.79	43.1	2%	6.05	24%	0.21	2.4E-05	0.00010	0.0667	No
	Sodium Iodide	17%	-	-	-	-	-	-	-	-	-	-	
Hexylene Glycol and VM&P Naphtha													
Speedfam 1260 Water Based Vehicle Isopar L	Hexylene Glycol	60%	1045	7.11	7430.0	60%	0.070	0.28%	12.5	0.001	0.01	8.33	No
	Naphtha	40%	-	-	-	40%	5	20%	594.4	0.068	0.30	90	No
Aluminum, metal and oxide													
Sasol Aluminum Oxide (Al2O3)	-	100%	-	-	1653	100%	-	5%	82.7	0.0094	0.041	0.667	No
Barium, soluble compounds, as Ba													
TX-330 - Ferro Tamtron Barium Titanate	N/A	-	N/A	N/A	1206	100%	-	5%	60.3	0.0069	0.030		No
TX-003 - Ferro - TICON T Barium Titanate	N/A	-	N/A	N/A	661	100%	-	5%	33.1	0.0038	0.017		
						Total	-	-	93.4	0.011	0.047	0.0333	
Isopropyl Alcohol													
IPA	Isopropyl alcohol	100%	-	-	6129	100%	10.7	43%	2623.2	0.30	0.00015		No
IPAL	Isopropyl alcohol	60%	-	-	721	60%	10.7	43%	185.2	0.021	0.09		
	Toluene	32%	-	-	-	-	-	-	-	-	-		
	Acetone	6%	-	-	-	-	-	-	-	-	-		
	MIBK	2%	-	-	-	-	-	-	-	-	-		
						Total	-	-	2808.4	0.32	0.09	65.3	
Oxide and inorganic compounds, except SnH4, as Sn													
Keeling Walker RF Tin Oxide (SnO2)	-	-	-	-	1000	100%	-	5%	50.0	0.0057	0.025		No
Keeling and Walker PZT Tin Oxide (Sn2O3)	-	-	-	-	300	100%	-	5%	15.0	0.0017	0.0075		
						Total	-	-	65.0	0.0074	0.033	0.133	
Zirconium compounds as Zr													
Daiichi DK-2 Zirconium Oxide (ZrO2)	-	-	-	-	26455	100%	-	5%	1322.8	0.15	0.66		No
Daiichi Zirconium Oxide (ZrO2)	-	-	-	-	15432	100%	-	5%	771.6	0.088	0.39		
Z Tech Green Zirconium Oxide (ZrO2)	-	-	-	-	5060	100%	-	5%	253	0.029	0.13		
						Total	-	-	2347.4	0.27	1.2	0.333	

Notes:

[1] 2015 Purchase quantities provided by CTS electronics

[2] Given the mostly enclosed operations at CTS, the evaporation rates estimated based on vapor pressures of liquid chemicals relative to 25 mmHg, which is estimated to produce 100% loss per year of purchased chemical. Solids conservatively assumed 5% chemical loss to atmosphere. Solids conservatively assumed 5% chemical loss to atmosphere.

[3] Evaporation/decomposition emissions of hydrogen peroxide from CTS would be oxygen and water vapor before reaching publically accessible (fencline equivalent) locations around the facility. Therefore, no hazards to model.

GRI-HAPCalc ® 3.01
External Combustion Devices Report

Facility ID:	**CTS**	**Notes:**
Operation Type:	**PRODUCTION**	
Facility Name:	**CTS ALBUQUERQUE, NM**	
User Name:	**M. Rosado**	
Units of Measure:	**U.S. STANDARD**	

Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero.
These emissions are indicated on the report with a "0".
Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".

External Combustion Devices

Unit Name: 3.78 MMBTU/hr Boiler (11b. and 11c.)

Hours of Operation:	4,380	Yearly
Heat Input:	3.78	MMBtu/hr
Fuel Type:	NATURAL GAS	
Device Type:	BOILER	
Emission Factor Set:	EPA > FIELD > LITERATURE	
Additional EF Set:	-NONE-	

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
3-Methylcholanthrene	0.0000	0.0000000018	lb/MMBtu	EPA
7,12-Dimethylbenz(a)anthracene	0.0000	0.0000000157	lb/MMBtu	EPA
Formaldehyde	0.0006	0.0000735294	lb/MMBtu	EPA
Methanol	0.0036	0.0004333330	lb/MMBtu	GRI Field
Acetaldehyde	0.0024	0.0002909000	lb/MMBtu	GRI Field
1,3-Butadiene	0.0000	0.0000001830	lb/MMBtu	GRI Field
Benzene	0.0000	0.0000020588	lb/MMBtu	EPA
Toluene	0.0000	0.0000033333	lb/MMBtu	EPA
Ethylbenzene	0.0000	0.0000000720	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0000	0.0000010610	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0003	0.0000323000	lb/MMBtu	GRI Field
n-Hexane	0.0146	0.0017647059	lb/MMBtu	EPA
Phenol	0.0000	0.0000000950	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005980	lb/MMBtu	EPA
2-Methylnaphthalene	0.0000	0.0000000235	lb/MMBtu	EPA
Acenaphthylene	0.0000	0.0000000018	lb/MMBtu	EPA
Biphenyl	0.0000	0.0000011500	lb/MMBtu	GRI Field
Acenaphthene	0.0000	0.0000000018	lb/MMBtu	EPA
Fluorene	0.0000	0.0000000027	lb/MMBtu	EPA
Anthracene	0.0000	0.0000000024	lb/MMBtu	EPA
Phenanthrene	0.0000	0.0000000167	lb/MMBtu	EPA
Fluoranthene	0.0000	0.0000000029	lb/MMBtu	EPA
Pyrene	0.0000	0.0000000049	lb/MMBtu	EPA
Benz(a)anthracene	0.0000	0.0000000018	lb/MMBtu	EPA
Chrysene	0.0000	0.0000000018	lb/MMBtu	EPA

Benzo(a)pyrene	0.0000	0.0000000012	lb/MMBtu	EPA
Benzo(b)fluoranthene	0.0000	0.0000000018	lb/MMBtu	EPA
Benzo(k)fluoranthene	0.0000	0.0000000018	lb/MMBtu	EPA
Benzo(g,h,i)perylene	0.0000	0.0000000012	lb/MMBtu	EPA
Indeno(1,2,3-c,d)pyrene	0.0000	0.0000000018	lb/MMBtu	EPA
Dibenz(a,h)anthracene	0.0000	0.0000000012	lb/MMBtu	EPA
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0215			

Criteria Pollutants

VOC	0.0446	0.0053921569	lb/MMBtu	EPA
PM	0.0617	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.0463	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0154	0.0018627451	lb/MMBtu	EPA
CO	0.6817	0.0823529410	lb/MMBtu	EPA
NMHC	0.0706	0.0085294118	lb/MMBtu	EPA
NOx	0.8116	0.0980392157	lb/MMBtu	EPA
SO2	0.0049	0.0005880000	lb/MMBtu	EPA

Other Pollutants

Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0187	0.0022549020	lb/MMBtu	EPA
Acetylene	0.0441	0.0053314000	lb/MMBtu	GRI Field
Ethylene	0.0044	0.0005264000	lb/MMBtu	GRI Field
Ethane	0.0252	0.0030392157	lb/MMBtu	EPA
Propylene	0.0077	0.0009333330	lb/MMBtu	GRI Field
Propane	0.0130	0.0015686275	lb/MMBtu	EPA
Butane	0.0170	0.0020588235	lb/MMBtu	EPA
Cyclopentane	0.0003	0.0000405000	lb/MMBtu	GRI Field
Pentane	0.0211	0.0025490196	lb/MMBtu	EPA
n-Pentane	0.0166	0.0020000000	lb/MMBtu	GRI Field
Cyclohexane	0.0004	0.0000451000	lb/MMBtu	GRI Field
Methylcyclohexane	0.0014	0.0001691000	lb/MMBtu	GRI Field
n-Octane	0.0004	0.0000506000	lb/MMBtu	GRI Field
n-Nonane	0.0000	0.0000050000	lb/MMBtu	GRI Field
CO2	973.9059	117.6470588235	lb/MMBtu	EPA

Unit Name: 7.1 MMBTU/hr Boiler (11a.)

Hours of Operation: 8,760 Yearly

Heat Input: 7.1 MMBtu/hr

Fuel Type: NATURAL GAS

Device Type: BOILER

Emission Factor Set: EPA > FIELD > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
3-Methylcholanthrene	0.0000	0.0000000018	lb/MMBtu	EPA
7,12-Dimethylbenz(a)anthracene	0.0000	0.0000000157	lb/MMBtu	EPA
Formaldehyde	0.0023	0.0000735294	lb/MMBtu	EPA

Methanol	0.0135	0.0004333330	lb/MMBtu	GRI Field
Acetaldehyde	0.0090	0.0002909000	lb/MMBtu	GRI Field
1,3-Butadiene	0.0000	0.0000001830	lb/MMBtu	GRI Field
Benzene	0.0001	0.0000020588	lb/MMBtu	EPA
Toluene	0.0001	0.0000033333	lb/MMBtu	EPA
Ethylbenzene	0.0000	0.0000000720	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0000	0.0000010610	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0010	0.0000323000	lb/MMBtu	GRI Field
n-Hexane	0.0549	0.0017647059	lb/MMBtu	EPA
Phenol	0.0000	0.0000000950	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005980	lb/MMBtu	EPA
2-Methylnaphthalene	0.0000	0.0000000235	lb/MMBtu	EPA
Acenaphthylene	0.0000	0.0000000018	lb/MMBtu	EPA
Biphenyl	0.0000	0.0000011500	lb/MMBtu	GRI Field
Acenaphthene	0.0000	0.0000000018	lb/MMBtu	EPA
Fluorene	0.0000	0.0000000027	lb/MMBtu	EPA
Anthracene	0.0000	0.0000000024	lb/MMBtu	EPA
Phenanthrene	0.0000	0.0000000167	lb/MMBtu	EPA
Fluoranthene	0.0000	0.0000000029	lb/MMBtu	EPA
Pyrene	0.0000	0.0000000049	lb/MMBtu	EPA
Benz(a)anthracene	0.0000	0.0000000018	lb/MMBtu	EPA
Chrysene	0.0000	0.0000000018	lb/MMBtu	EPA
Benzo(a)pyrene	0.0000	0.0000000012	lb/MMBtu	EPA
Benzo(b)fluoranthene	0.0000	0.0000000018	lb/MMBtu	EPA
Benzo(k)fluoranthene	0.0000	0.0000000018	lb/MMBtu	EPA
Benzo(g,h,i)perylene	0.0000	0.0000000012	lb/MMBtu	EPA
Indeno(1,2,3-c,d)pyrene	0.0000	0.0000000018	lb/MMBtu	EPA
Dibenz(a,h)anthracene	0.0000	0.0000000012	lb/MMBtu	EPA
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0809			

Criteria Pollutants

VOC	0.1677	0.0053921569	lb/MMBtu	EPA
PM	0.2317	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.1738	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0579	0.0018627451	lb/MMBtu	EPA
CO	2.5610	0.0823529410	lb/MMBtu	EPA
NMHC	0.2652	0.0085294118	lb/MMBtu	EPA
NOx	3.0488	0.0980392157	lb/MMBtu	EPA
SO2	0.0183	0.0005880000	lb/MMBtu	EPA

Other Pollutants

Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0701	0.0022549020	lb/MMBtu	EPA
Acetylene	0.1658	0.0053314000	lb/MMBtu	GRI Field
Ethylene	0.0164	0.0005264000	lb/MMBtu	GRI Field
Ethane	0.0945	0.0030392157	lb/MMBtu	EPA
Propylene	0.0290	0.0009333330	lb/MMBtu	GRI Field
Propane	0.0488	0.0015686275	lb/MMBtu	EPA
Butane	0.0640	0.0020588235	lb/MMBtu	EPA
Cyclopentane	0.0013	0.0000405000	lb/MMBtu	GRI Field
Pentane	0.0793	0.0025490196	lb/MMBtu	EPA
n-Pentane	0.0622	0.0020000000	lb/MMBtu	GRI Field
Cyclohexane	0.0014	0.0000451000	lb/MMBtu	GRI Field

Methylcyclohexane	0.0053	0.0001691000	lb/MMBtu	GRI Field
n-Octane	0.0016	0.0000506000	lb/MMBtu	GRI Field
n-Nonane	0.0002	0.0000050000	lb/MMBtu	GRI Field
CO2	3,658.5882	117.6470588235	lb/MMBtu	EPA

Unit Name: Spray Dryer #1

Hours of Operation: 8,760 Yearly

Heat Input: 0.067 MMBtu/hr

Fuel Type: NATURAL GAS

Device Type: BURNER

Emission Factor Set: EPA > FIELD > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
Formaldehyde	0.0000	0.0000735294	lb/MMBtu	EPA
Methanol	0.0001	0.0004333330	lb/MMBtu	GRI Field
Acetaldehyde	0.0001	0.0002909000	lb/MMBtu	GRI Field
1,3-Butadiene	0.0000	0.0000001830	lb/MMBtu	GRI Field
Benzene	0.0000	0.0000020588	lb/MMBtu	EPA
Toluene	0.0000	0.0000033333	lb/MMBtu	EPA
Ethylbenzene	0.0000	0.0000000720	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0000	0.0000010610	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0000	0.0000323000	lb/MMBtu	GRI Field
n-Hexane	0.0005	0.0017647059	lb/MMBtu	EPA
Phenol	0.0000	0.0000000950	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005980	lb/MMBtu	EPA
2-Methylnaphthalene	0.0000	0.0000000235	lb/MMBtu	EPA
Biphenyl	0.0000	0.0000011500	lb/MMBtu	GRI Field
Phenanthrene	0.0000	0.0000000167	lb/MMBtu	EPA
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0007			
Criteria Pollutants				
VOC	0.0017	0.0053921569	lb/MMBtu	EPA
PM	0.0023	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.0017	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0006	0.0018627451	lb/MMBtu	EPA
CO	0.0252	0.0823529410	lb/MMBtu	EPA
NMHC	0.0026	0.0085294118	lb/MMBtu	EPA
NOx	0.0301	0.0980392157	lb/MMBtu	EPA
SO2	0.0002	0.0005880000	lb/MMBtu	EPA
Other Pollutants				
Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0007	0.0022549020	lb/MMBtu	EPA
Acetylene	0.0016	0.0053314000	lb/MMBtu	GRI Field
Ethylene	0.0002	0.0005264000	lb/MMBtu	GRI Field
Ethane	0.0009	0.0030392157	lb/MMBtu	EPA
Propylene	0.0003	0.0009333330	lb/MMBtu	GRI Field

Propane	0.0005	0.0015686275	lb/MMBtu	EPA
Butane	0.0006	0.0020588235	lb/MMBtu	EPA
Cyclopentane	0.0000	0.0000405000	lb/MMBtu	GRI Field
Pentane	0.0008	0.0025490196	lb/MMBtu	EPA
n-Pentane	0.0006	0.0020000000	lb/MMBtu	GRI Field
Cyclohexane	0.0000	0.0000451000	lb/MMBtu	GRI Field
Methylcyclohexane	0.0001	0.0001691000	lb/MMBtu	GRI Field
n-Octane	0.0000	0.0000506000	lb/MMBtu	GRI Field
n-Nonane	0.0000	0.0000050000	lb/MMBtu	GRI Field
CO2	36.0706	117.6470588235	lb/MMBtu	EPA

Unit Name: Spray Dryer #3

Hours of Operation: 8,760 Yearly

Heat Input: 0.086 MMBtu/hr

Fuel Type: NATURAL GAS

Device Type: BURNER

Emission Factor Set: EPA > FIELD > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
7,12-Dimethylbenz(a)anthracene	0.0000	0.0000000157	lb/MMBtu	EPA
Formaldehyde	0.0000	0.0000735294	lb/MMBtu	EPA
Methanol	0.0002	0.0004333330	lb/MMBtu	GRI Field
Acetaldehyde	0.0001	0.0002909000	lb/MMBtu	GRI Field
1,3-Butadiene	0.0000	0.0000001830	lb/MMBtu	GRI Field
Benzene	0.0000	0.0000020588	lb/MMBtu	EPA
Toluene	0.0000	0.0000033333	lb/MMBtu	EPA
Ethylbenzene	0.0000	0.0000000720	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0000	0.0000010610	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0000	0.0000323000	lb/MMBtu	GRI Field
n-Hexane	0.0007	0.0017647059	lb/MMBtu	EPA
Phenol	0.0000	0.0000000950	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005980	lb/MMBtu	EPA
2-Methylnaphthalene	0.0000	0.0000000235	lb/MMBtu	EPA
Biphenyl	0.0000	0.0000011500	lb/MMBtu	GRI Field
Phenanthrene	0.0000	0.0000000167	lb/MMBtu	EPA
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0010			
Criteria Pollutants				
VOC	0.0021	0.0053921569	lb/MMBtu	EPA
PM	0.0029	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.0022	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0007	0.0018627451	lb/MMBtu	EPA
CO	0.0325	0.0823529410	lb/MMBtu	EPA
NMHC	0.0034	0.0085294118	lb/MMBtu	EPA
NOx	0.0386	0.0980392157	lb/MMBtu	EPA
SO2	0.0002	0.0005880000	lb/MMBtu	EPA

Other Pollutants

Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0009	0.0022549020	lb/MMBtu	EPA
Acetylene	0.0021	0.0053314000	lb/MMBtu	GRI Field
Ethylene	0.0002	0.0005264000	lb/MMBtu	GRI Field
Ethane	0.0012	0.0030392157	lb/MMBtu	EPA
Propylene	0.0004	0.0009333330	lb/MMBtu	GRI Field
Propane	0.0006	0.0015686275	lb/MMBtu	EPA
Butane	0.0008	0.0020588235	lb/MMBtu	EPA
Cyclopentane	0.0000	0.0000405000	lb/MMBtu	GRI Field
Pentane	0.0010	0.0025490196	lb/MMBtu	EPA
n-Pentane	0.0008	0.0020000000	lb/MMBtu	GRI Field
Cyclohexane	0.0000	0.0000451000	lb/MMBtu	GRI Field
Methylcyclohexane	0.0001	0.0001691000	lb/MMBtu	GRI Field
n-Octane	0.0000	0.0000506000	lb/MMBtu	GRI Field
n-Nonane	0.0000	0.0000050000	lb/MMBtu	GRI Field
CO2	46.3765	117.6470588235	lb/MMBtu	EPA

Unit Name: H2O HEATER

Hours of Operation: 8,760 Yearly

Heat Input: 0.399 MMBtu/hr

Fuel Type: NATURAL GAS

Device Type: HEATER

Emission Factor Set: FIELD > EPA > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
7,12-Dimethylbenz(a)anthracene	0.0000	0.0000000157	lb/MMBtu	EPA
Formaldehyde	0.0015	0.0008440090	lb/MMBtu	GRI Field
Methanol	0.0017	0.0009636360	lb/MMBtu	GRI Field
Acetaldehyde	0.0013	0.0007375920	lb/MMBtu	GRI Field
1,3-Butadiene	0.0006	0.0003423350	lb/MMBtu	GRI Field
Benzene	0.0013	0.0007480470	lb/MMBtu	GRI Field
Toluene	0.0018	0.0010163310	lb/MMBtu	GRI Field
Ethylbenzene	0.0037	0.0021128220	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0023	0.0013205140	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0050	0.0028417580	lb/MMBtu	GRI Field
n-Hexane	0.0025	0.0014070660	lb/MMBtu	GRI Field
Phenol	0.0000	0.0000001070	lb/MMBtu	GRI Field
Styrene	0.0036	0.0020788960	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005100	lb/MMBtu	GRI Field
2-Methylnaphthalene	0.0000	0.0000001470	lb/MMBtu	GRI Field
Acenaphthylene	0.0000	0.0000000670	lb/MMBtu	GRI Field
Biphenyl	0.0000	0.0000004730	lb/MMBtu	GRI Field
Acenaphthene	0.0000	0.0000000900	lb/MMBtu	GRI Field
Fluorene	0.0000	0.0000000800	lb/MMBtu	GRI Field
Anthracene	0.0000	0.0000000870	lb/MMBtu	GRI Field
Phenanthrene	0.0000	0.0000000600	lb/MMBtu	GRI Field
Fluoranthene	0.0000	0.0000000900	lb/MMBtu	GRI Field

Pyrene	0.0000	0.0000000830	lb/MMBtu	GRI Field
Benz(a)anthracene	0.0000	0.0000000870	lb/MMBtu	GRI Field
Chrysene	0.0000	0.0000001170	lb/MMBtu	GRI Field
Benzo(a)pyrene	0.0000	0.0000000700	lb/MMBtu	GRI Field
Benzo(b)fluoranthene	0.0000	0.0000001500	lb/MMBtu	GRI Field
Benzo(k)fluoranthene	0.0000	0.0000007600	lb/MMBtu	GRI Field
Benzo(g,h,i)perylene	0.0000	0.0000002600	lb/MMBtu	GRI Field
Indeno(1,2,3-c,d)pyrene	0.0000	0.0000001200	lb/MMBtu	GRI Field
Dibenz(a,h)anthracene	0.0000	0.0000001030	lb/MMBtu	GRI Field
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0253			

Criteria Pollutants

VOC	0.0094	0.0053921569	lb/MMBtu	EPA
PM	0.0131	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.0098	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0033	0.0018627451	lb/MMBtu	EPA
CO	0.0567	0.0323636360	lb/MMBtu	GRI Field
NMHC	0.0149	0.0085294118	lb/MMBtu	EPA
NOx	0.1700	0.0970167730	lb/MMBtu	GRI Field
SO2	0.0010	0.0005880000	lb/MMBtu	EPA

Other Pollutants

Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0184	0.0105212610	lb/MMBtu	GRI Field
Acetylene	0.0245	0.0140000000	lb/MMBtu	GRI Field
Ethylene	0.0017	0.0009476310	lb/MMBtu	GRI Field
Ethane	0.0046	0.0026312210	lb/MMBtu	GRI Field
Propylene	0.0041	0.0023454550	lb/MMBtu	GRI Field
Propane	0.0019	0.0010686280	lb/MMBtu	GRI Field
Isobutane	0.0026	0.0014640770	lb/MMBtu	GRI Field
Butane	0.0024	0.0013766990	lb/MMBtu	GRI Field
Cyclopentane	0.0020	0.0011304940	lb/MMBtu	GRI Field
Pentane	0.0061	0.0034671850	lb/MMBtu	GRI Field
n-Pentane	0.0025	0.0014221310	lb/MMBtu	GRI Field
Cyclohexane	0.0016	0.0009183830	lb/MMBtu	GRI Field
Methylcyclohexane	0.0039	0.0022011420	lb/MMBtu	GRI Field
n-Octane	0.0050	0.0028538830	lb/MMBtu	GRI Field
1,2,3-Trimethylbenzene	0.0060	0.0034224540	lb/MMBtu	GRI Field
1,2,4-Trimethylbenzene	0.0060	0.0034224540	lb/MMBtu	GRI Field
1,3,5-Trimethylbenzene	0.0060	0.0034224540	lb/MMBtu	GRI Field
n-Nonane	0.0064	0.0036604170	lb/MMBtu	GRI Field
CO2	206.1176	117.6470588235	lb/MMBtu	EPA

Unit Name: RENZOR Heater

Hours of Operation: 8,760 Yearly

Heat Input: 0.5 MMBtu/hr

Fuel Type: NATURAL GAS

Device Type: HEATER

Emission Factor Set: FIELD > EPA > LITERATURE

Additional EF Set: -NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor		Emission Factor Set
HAPs				
7,12-Dimethylbenz(a)anthracene	0.0000	0.0000000157	lb/MMBtu	EPA
Formaldehyde	0.0018	0.0008440090	lb/MMBtu	GRI Field
Methanol	0.0021	0.0009636360	lb/MMBtu	GRI Field
Acetaldehyde	0.0016	0.0007375920	lb/MMBtu	GRI Field
1,3-Butadiene	0.0007	0.0003423350	lb/MMBtu	GRI Field
Benzene	0.0016	0.0007480470	lb/MMBtu	GRI Field
Toluene	0.0022	0.0010163310	lb/MMBtu	GRI Field
Ethylbenzene	0.0046	0.0021128220	lb/MMBtu	GRI Field
Xylenes(m,p,o)	0.0029	0.0013205140	lb/MMBtu	GRI Field
2,2,4-Trimethylpentane	0.0062	0.0028417580	lb/MMBtu	GRI Field
n-Hexane	0.0031	0.0014070660	lb/MMBtu	GRI Field
Phenol	0.0000	0.0000001070	lb/MMBtu	GRI Field
Styrene	0.0046	0.0020788960	lb/MMBtu	GRI Field
Naphthalene	0.0000	0.0000005100	lb/MMBtu	GRI Field
2-Methylnaphthalene	0.0000	0.0000001470	lb/MMBtu	GRI Field
Acenaphthylene	0.0000	0.0000000670	lb/MMBtu	GRI Field
Biphenyl	0.0000	0.0000004730	lb/MMBtu	GRI Field
Acenaphthene	0.0000	0.0000000900	lb/MMBtu	GRI Field
Fluorene	0.0000	0.0000000800	lb/MMBtu	GRI Field
Anthracene	0.0000	0.0000000870	lb/MMBtu	GRI Field
Phenanthrene	0.0000	0.0000000600	lb/MMBtu	GRI Field
Fluoranthene	0.0000	0.0000000900	lb/MMBtu	GRI Field
Pyrene	0.0000	0.0000000830	lb/MMBtu	GRI Field
Benz(a)anthracene	0.0000	0.0000000870	lb/MMBtu	GRI Field
Chrysene	0.0000	0.0000001170	lb/MMBtu	GRI Field
Benzo(a)pyrene	0.0000	0.0000000700	lb/MMBtu	GRI Field
Benzo(b)fluoranthene	0.0000	0.0000001500	lb/MMBtu	GRI Field
Benzo(k)fluoranthene	0.0000	0.0000007600	lb/MMBtu	GRI Field
Benzo(g,h,i)perylene	0.0000	0.0000002600	lb/MMBtu	GRI Field
Indeno(1,2,3-c,d)pyrene	0.0000	0.0000001200	lb/MMBtu	GRI Field
Dibenz(a,h)anthracene	0.0000	0.0000001030	lb/MMBtu	GRI Field
Lead	0.0000	0.0000004902	lb/MMBtu	EPA
Total	0.0314			
Criteria Pollutants				
VOC	0.0118	0.0053921569	lb/MMBtu	EPA
PM	0.0163	0.0074509804	lb/MMBtu	EPA
PM, Condensible	0.0122	0.0055882353	lb/MMBtu	EPA
PM, Filterable	0.0041	0.0018627451	lb/MMBtu	EPA
CO	0.0709	0.0323636360	lb/MMBtu	GRI Field
NMHC	0.0187	0.0085294118	lb/MMBtu	EPA

NOx	0.2125	0.0970167730	lb/MMBtu	GRI Field
SO2	0.0013	0.0005880000	lb/MMBtu	EPA

Other Pollutants

Dichlorobenzene	0.0000	0.0000011765	lb/MMBtu	EPA
Methane	0.0230	0.0105212610	lb/MMBtu	GRI Field
Acetylene	0.0307	0.0140000000	lb/MMBtu	GRI Field
Ethylene	0.0021	0.0009476310	lb/MMBtu	GRI Field
Ethane	0.0058	0.0026312210	lb/MMBtu	GRI Field
Propylene	0.0051	0.0023454550	lb/MMBtu	GRI Field
Propane	0.0023	0.0010686280	lb/MMBtu	GRI Field
Isobutane	0.0032	0.0014640770	lb/MMBtu	GRI Field
Butane	0.0030	0.0013766990	lb/MMBtu	GRI Field
Cyclopentane	0.0025	0.0011304940	lb/MMBtu	GRI Field
Pentane	0.0076	0.0034671850	lb/MMBtu	GRI Field
n-Pentane	0.0031	0.0014221310	lb/MMBtu	GRI Field
Cyclohexane	0.0020	0.0009183830	lb/MMBtu	GRI Field
Methylcyclohexane	0.0048	0.0022011420	lb/MMBtu	GRI Field
n-Octane	0.0063	0.0028538830	lb/MMBtu	GRI Field
1,2,3-Trimethylbenzene	0.0075	0.0034224540	lb/MMBtu	GRI Field
1,2,4-Trimethylbenzene	0.0075	0.0034224540	lb/MMBtu	GRI Field
1,3,5-Trimethylbenzene	0.0075	0.0034224540	lb/MMBtu	GRI Field
n-Nonane	0.0080	0.0036604170	lb/MMBtu	GRI Field
CO2	257.6471	117.6470588235	lb/MMBtu	EPA

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

SUPPORTING INFORMATION

CTS Electronic Components

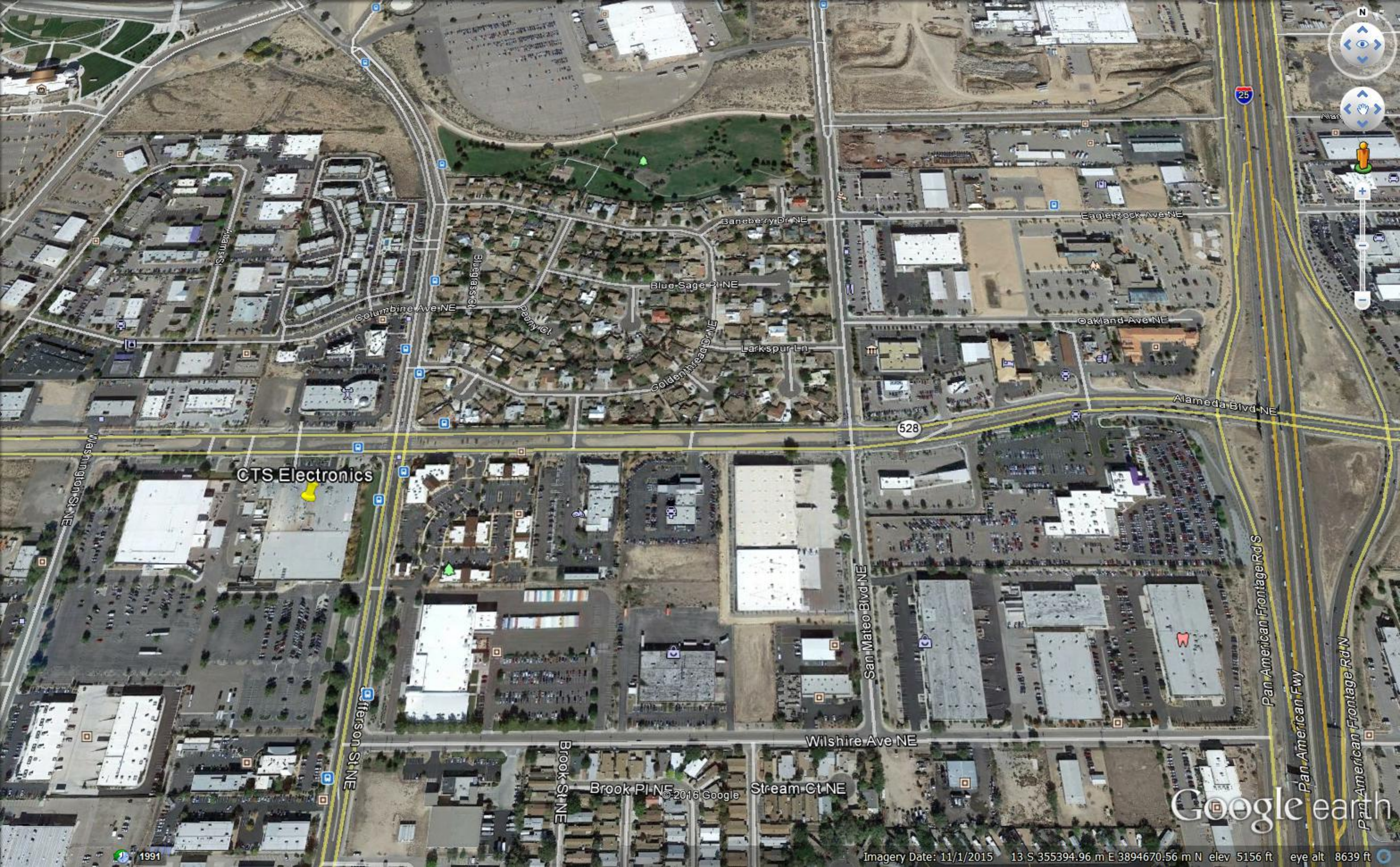
Application to Modify ATC Permit #217-M5

November 2016

Supporting Information

Aerial Maps of Facility &

Future Stack Locations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528
25
Adams St
Bluegrass Ct
Peony Ct
Washington St NE
Jefferson St NE
San Mateo Blvd NE
Wilshire Ave NE
Brook St NE
Brook Pl NE
Stream Ct NE
Pan American Frontage Rd S
Pan American Fwy
Pan American Frontage Rd N
© 2016 Google
Google earth
Imagery Date: 11/1/2015 13 S 355394.96 m E 3894670.56 m N elev 5156 ft eye alt 8639 ft

CTS Electronics
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Washington St NE
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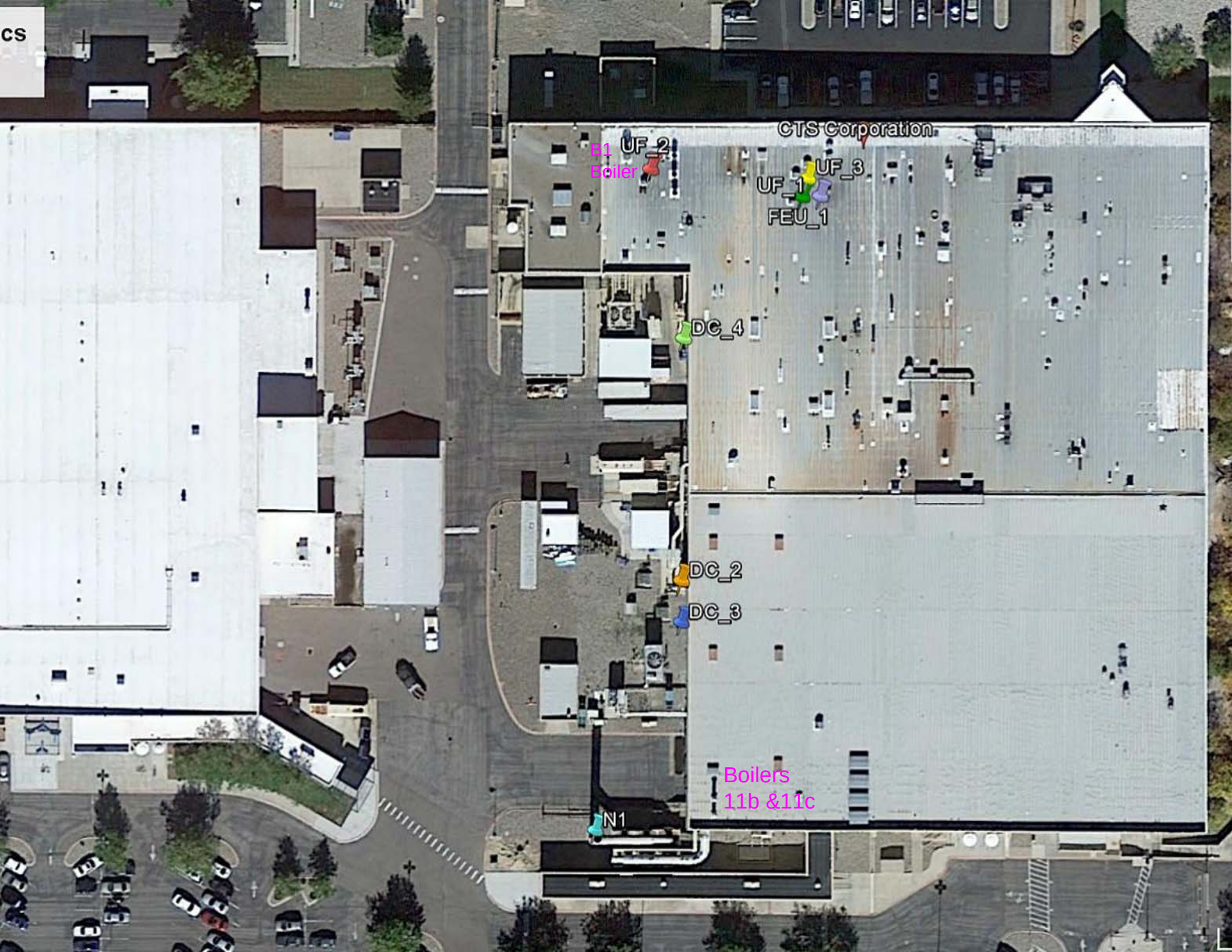
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Boiler
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DC_4
DC_2
DC_3
Boilers
11b &11c
N1

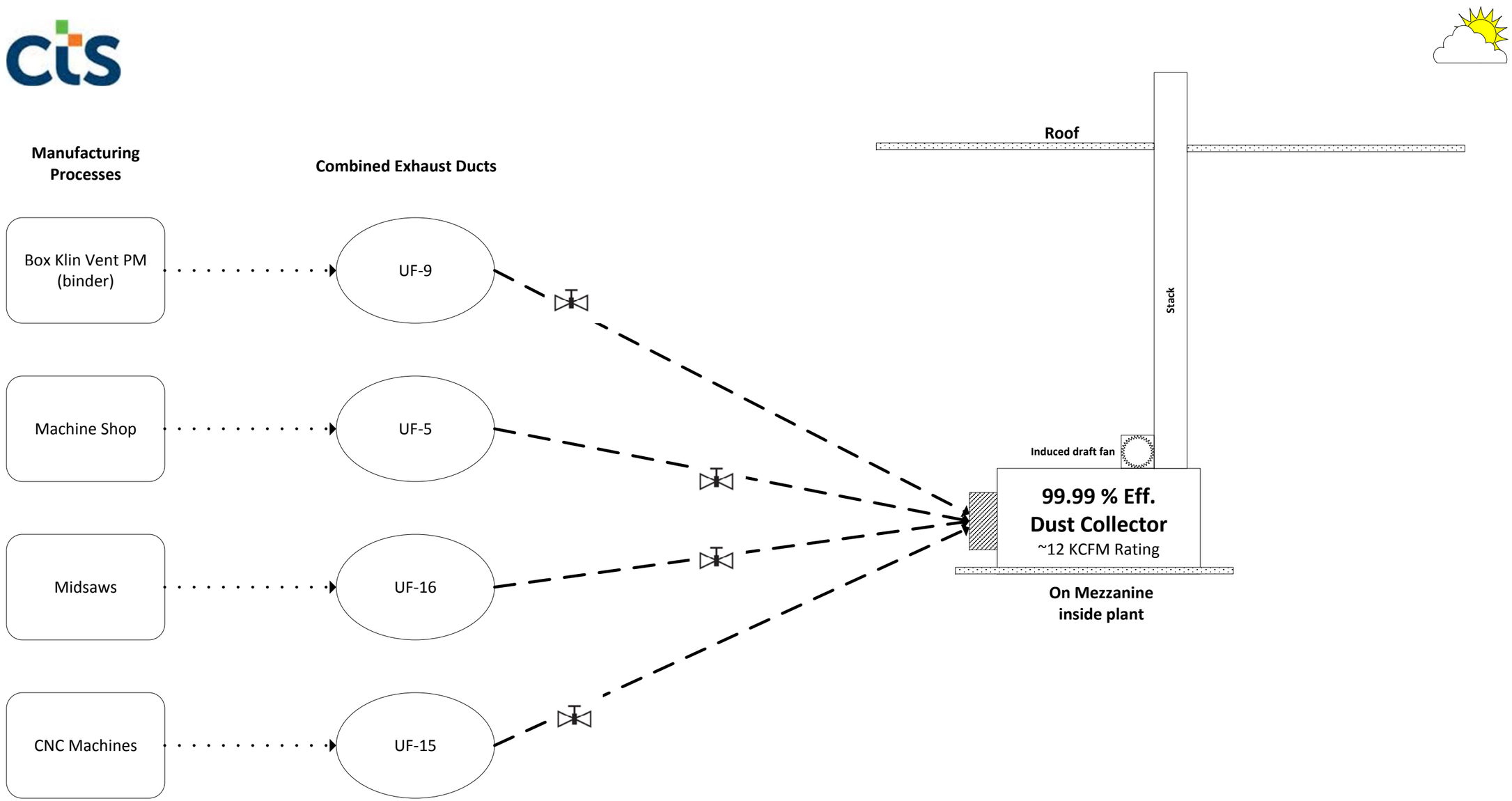
CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

Supporting Information

Process Flow Diagrams (PFDs)



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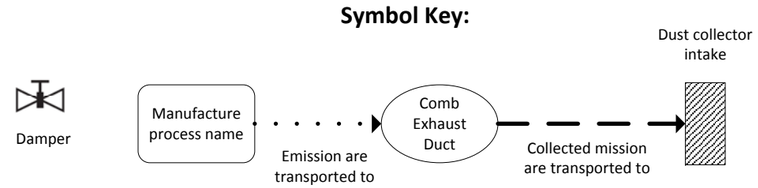
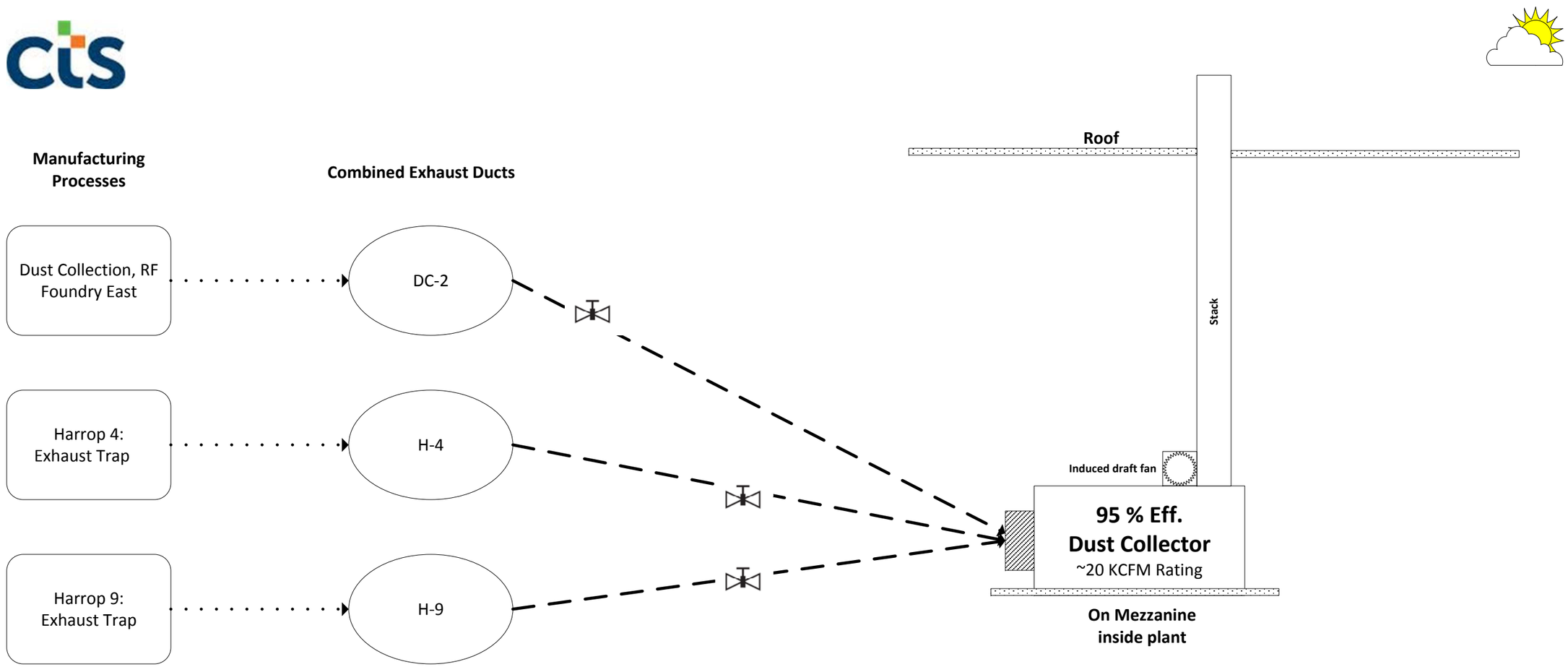


CTS Combo Stack FEU-1

4800 Alameda Blvd NE, Albuquerque, NM 87113



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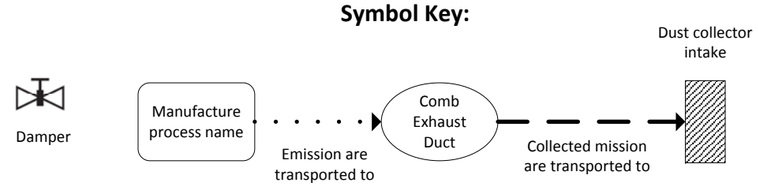
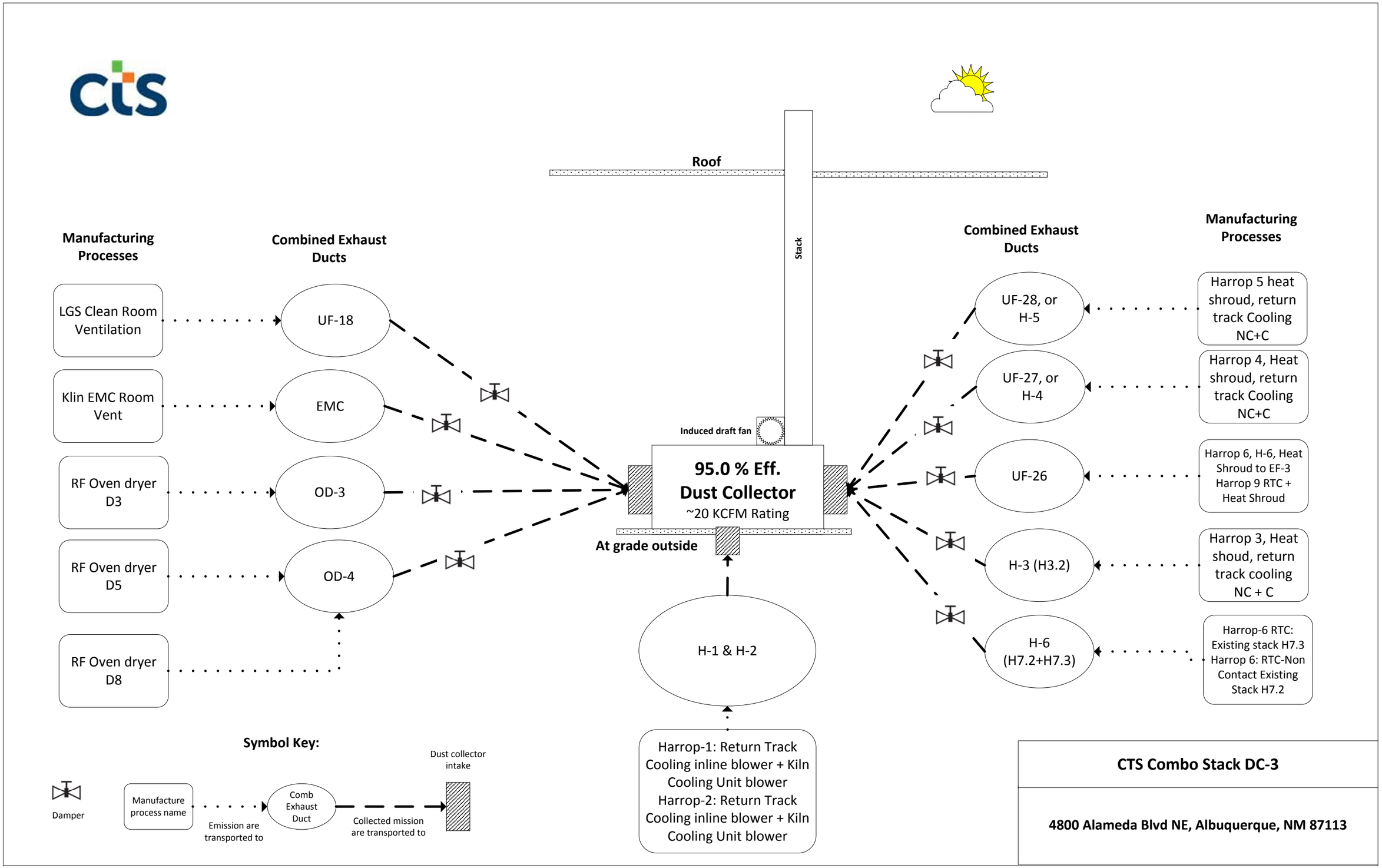
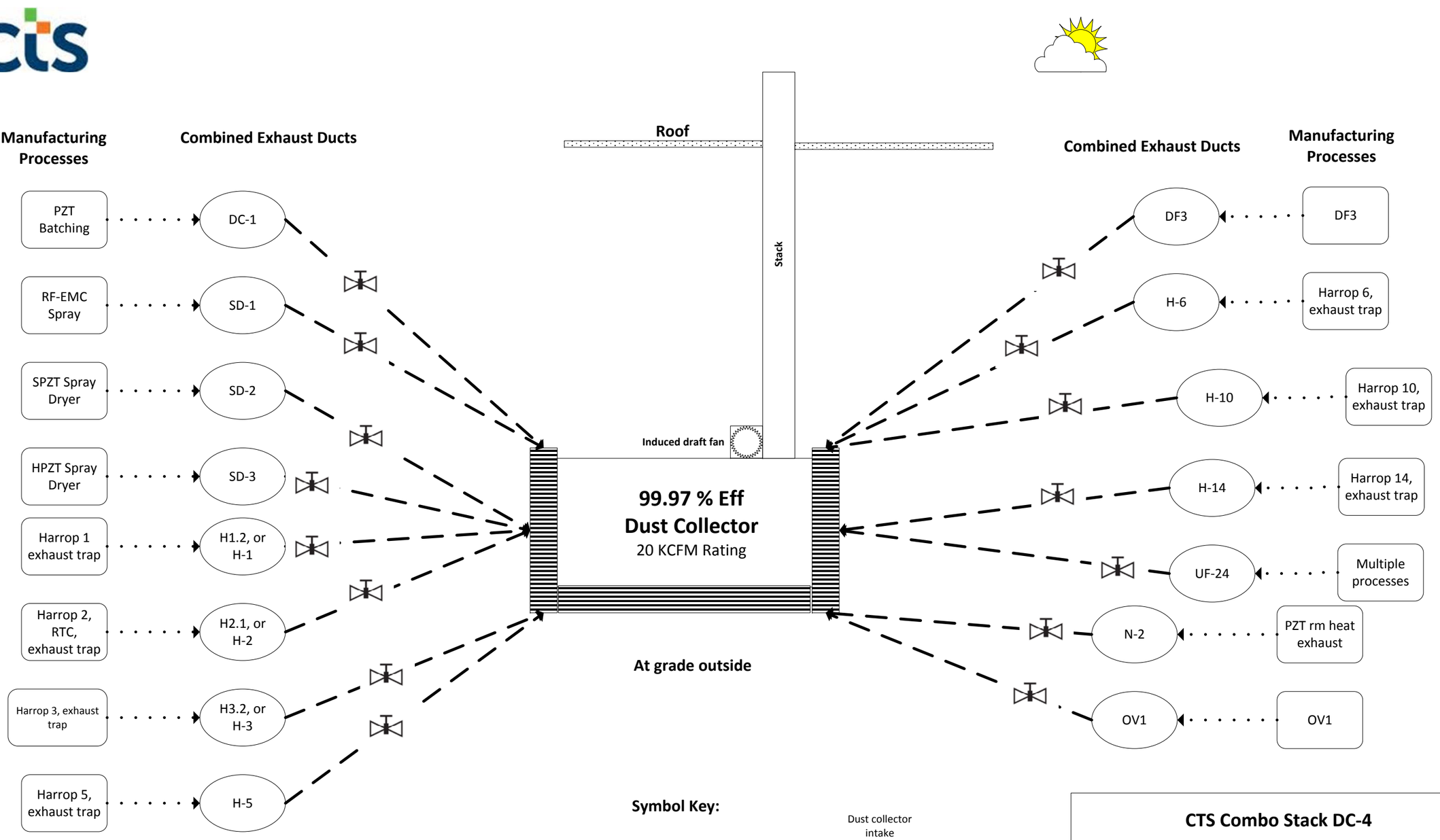


CTS Combo Stack DC-2

4800 Alameda Blvd NE, Albuquerque, NM 87113


Roof
Stack
Manufacturing Processes
Combined Exhaust Ducts
LGS Clean Room Ventilation
UF-18
Klin EMC Room Vent
EMC
RF Oven dryer D3
OD-3
RF Oven dryer D5
OD-4
RF Oven dryer D8
Induced draft fan
95.0 % Eff.
Dust Collector
~20 KCFM Rating
At grade outside
H-1 & H-2
Harrop-1: Return Track Cooling inline blower + Kiln Cooling Unit blower
Harrop-2: Return Track Cooling inline blower + Kiln Cooling Unit blower
Combined Exhaust Ducts
Manufacturing Processes
UF-28, or H-5
Harrop 5 heat shroud, return track Cooling NC+C
UF-27, or H-4
Harrop 4, Heat shroud, return track Cooling NC+C
UF-26
Harrop 6, H-6, Heat Shroud to EF-3 Harrop 9 RTC + Heat Shroud
H-3 (H3.2)
Harrop 3, Heat shoud, return track cooling NC + C
H-6 (H7.2+H7.3)
Harrop-6 RTC: Existing stack H7.3 Harrop 6: RTC-Non Contact Existing Stack H7.2
Symbol Key:
Damper
Manufacture process name
Emission are transported to
Comb Exhaust Duct
Collected mission are transported to
Dust collector intake
CTS Combo Stack DC-3
4800 Alameda Blvd NE, Albuquerque, NM 87113



CTS Combo Stack DC-4

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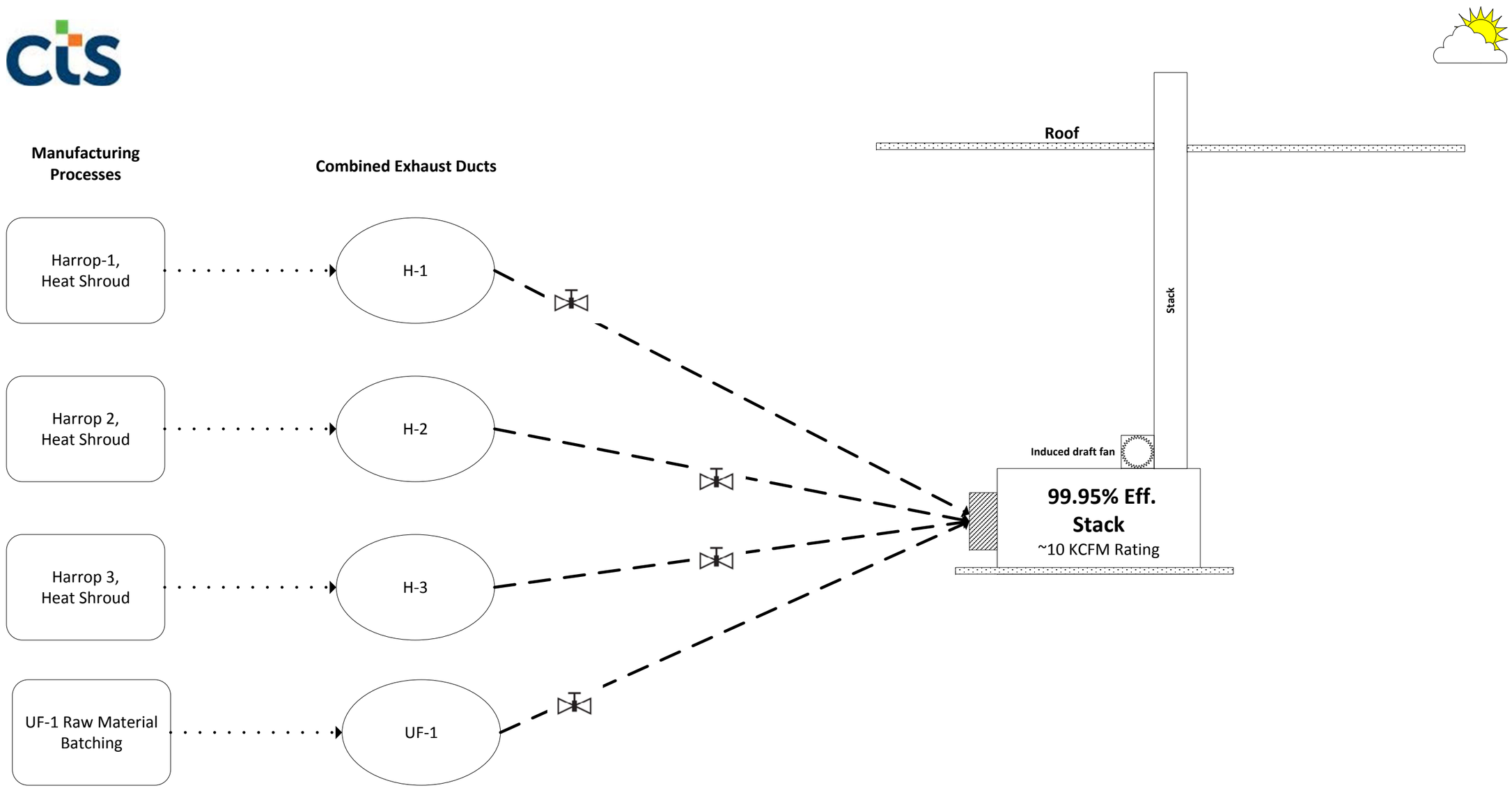

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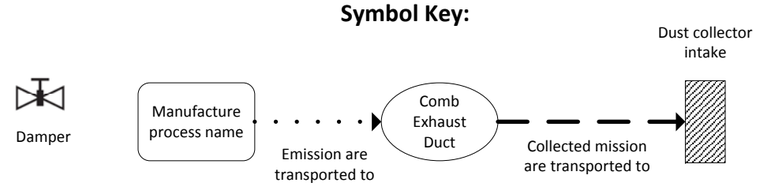

CTS Combo Stack UF-1

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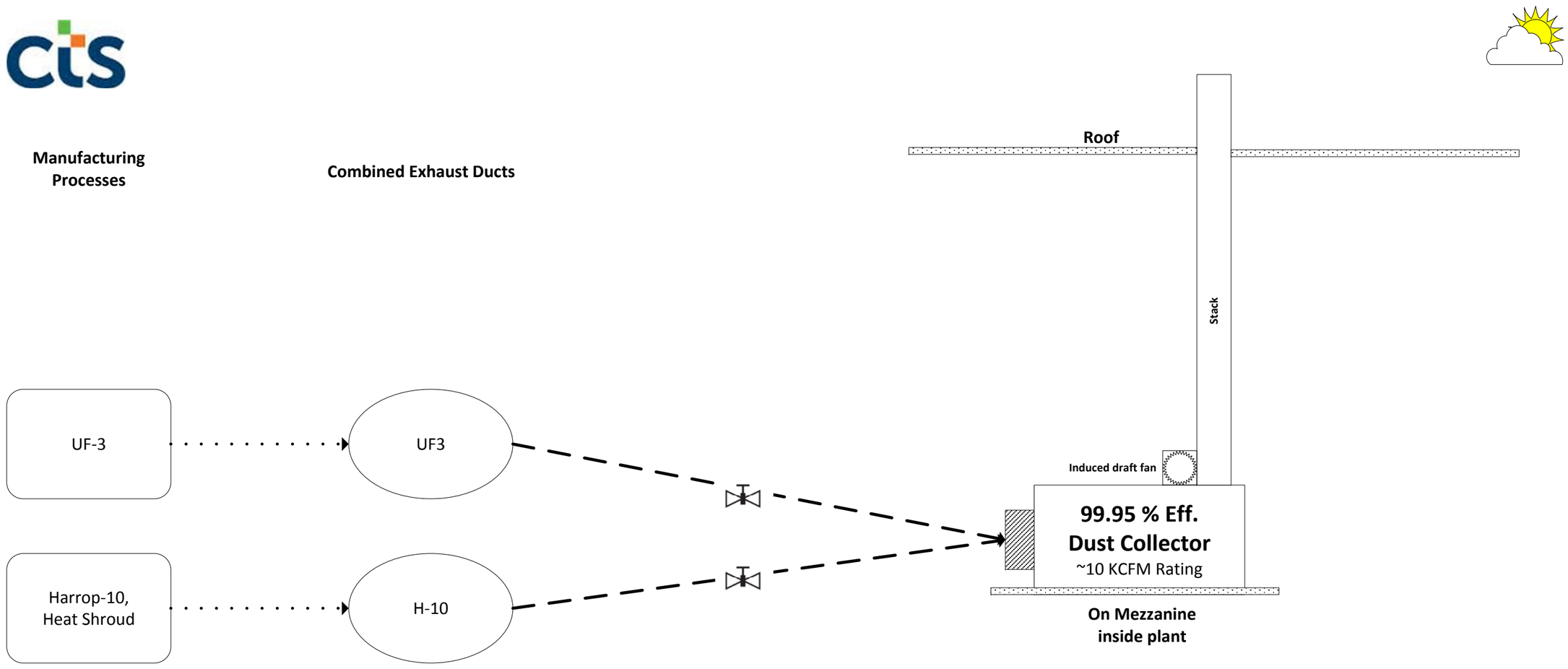
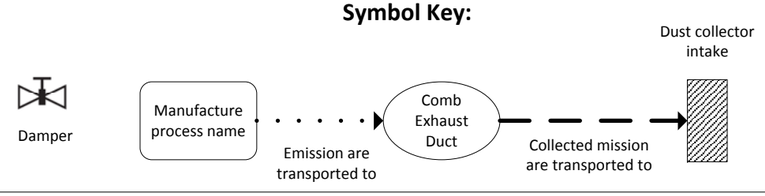


Symbol Key:



CTS Combo Stack UF-3

4800 Alameda Blvd NE, Albuquerque, NM 87113

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

Supporting Information

Engineering Stack Test Report

COMPLIANCE SERVICES & TESTING
P.O. Box 94191-87199
7108 Washington St. NE
Suite A
Albuquerque, NM 87109
(505) 681-4909 Phone
www.comptesting.com

Privileged & Confidential

5-24-16

John Wakefield
Environmental Safety Engineer
CTS Electronic Components, Inc.
4800 Alameda Blvd.
Albuquerque, NM 87113

Andrew Warren
Deputy General Counsel
CTS Corporation
2375 Cabot Drive
Lisle, IL 60532

RE: Emissions Testing at the Albuquerque, NM Facility

Mr. Wakefield / Mr. Warren,

Compliance Services & Testing of Albuquerque, NM performed stack tests on 10 sources from 4-18-16 to 5-4-16. The tests were to quantify the amount of total suspended particles (TSP), lead (Pb), and silver (Ag) being released into the atmosphere. The tests were commissioned for internal purposes only and followed prescribed and nonprescribed testing procedures. The results presented are not for compliance purposes but were collected using published methods. All of the samples were collected within acceptable isokinetic ranges (100% +/- 10%) except for SD2 and SD1, which were at 86.28% and 88.88%, respectively, which represent an "over collection" of particulate matter.

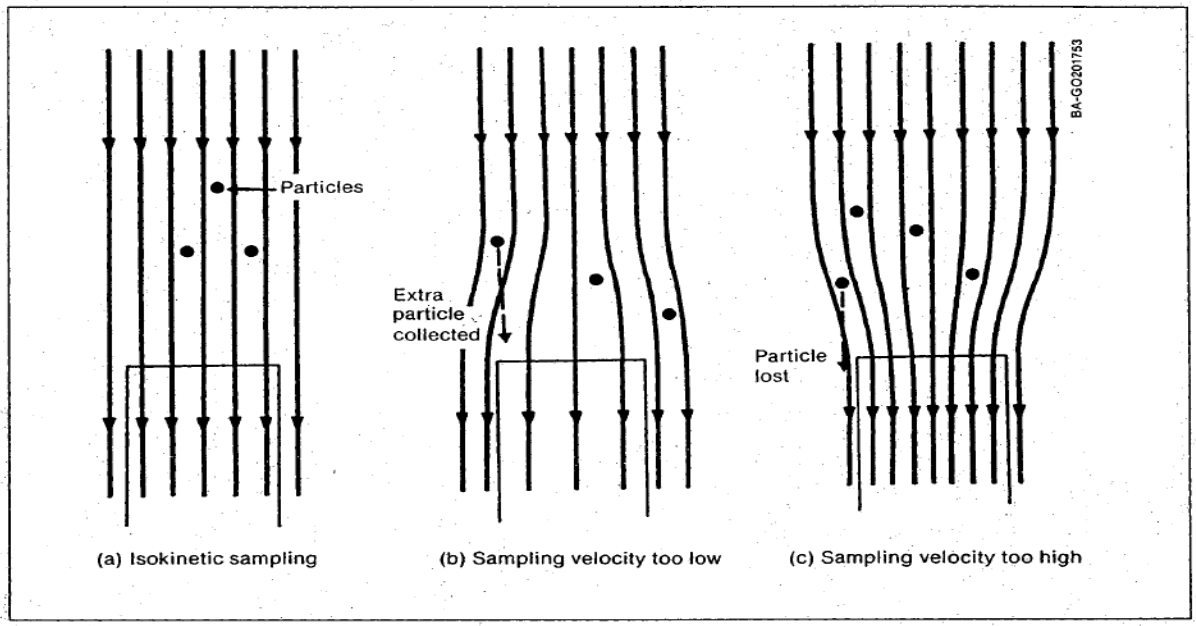


Fig. 7-10. Gas stream lines at the entrance to sampling probes (Source: Adapted from Strauss 1975, Fig. 2.12. © 1975. Used with permission of Pergamon Press)

The portion of the nonprescribed sampling procedures is in regard to the analytical method used to determine the impinger catch. EPA Method 6010C via an inductively coupled plasma spectrometer, was used to quantify the amount of lead (Pb) and silver (Ag) when applicable,

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(505) 681-4909 Phone
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whereas, the accepted stack testing procedure would be EPA Method 12 for Pb and EPA Method 29 for Ag and/or Pb. The amount of Pb and Ag from the filter catch was determined using the prescribed methods as well as the isokinetic sampling procedures (EPA Method 5). When testing stacks that were less than 12" diameter, all of the sampling was from the centroid of the stack. All other stacks were tested at the EPA Method 1 traverse point locations. Cyclonic flow checks were performed before any sampling commenced. During testing for UF2, UF3, and SD3, cyclonic flow was detected. Each sample point on UF2 closest to the port showed slight cyclonic activity (>20°) and might be contributed to atmospheric interference. The cyclonic activity of UF3 was characteristic of a swirling stack. The range of angles were from -55° to +40° from the horizontal position. The sampling occurred at a single point in each of the five traverse planes that was closest to the average differential pressure. The cyclonic angle measured in SD3 was at -40° and since the stack was measured at 8", the probe nozzle was placed at the same angle for the duration of the testing to maximize collection of particulates. All of the sampling was also performed for longer durations to ensure that enough particulate matter was collected to be measured. The mass emission rates were corrected to reflect pounds per "hour" and not per sampling time.

Unit DC2 was sampled twice due to an electronic failure in the sampling equipment that caused the heated filter box to elevate to a level that caused the PTFE filter to melt and compromise the collection efficiency. The sample was still recovered and analyzed, and reported as DC2-First Run. The second test run experienced no difficulties and is labeled as DC2-Second Run.

The sampling for Unit UF2 was split into two sections, the first at 80 minutes and the second at 140 minutes. The same collection media was used for both sets. The nozzle was changed out to better control the sampling variations being experienced with a higher flow and larger sample nozzle. Time-weighted averages were used where applicable.

The following data sheets are presented in chronological order. The field data sheets from Unit N1 are also included as well as the calculations used to determine the stack velocity and flow rate, as well as the mass emission rates, to serve as examples. All calibration certificates are on file and will be made available upon request.

Respectfully Submitted,

Chris Spencer
Director
Compliance Services and Testing, LLC

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Executive Summary of Emissions Testing - April 2016

Test Date	Sampling Designation	Time (minutes)	EFR (DSCF/Hr)	Velocity (feet/sec)	[TSP] (mg/SCF)	TSP (lbs/hr)	[Pb] (mg/SCF)	Pb (lbs/hr)	[Ag] (mg/SCF)	Ag (lbs/hr)
4/18/16	SD2	105	44,224	89.01	0.399	0.022	8.96E-04	4.99E-05	---	---
4/19/16	DC2-First	120	646,920	53.20	0.171	0.122	8.18E-05	5.83E-05	---	---
4/19/16	DC2-Second	120	681,889	56.19	0.079	0.059	2.25E-05	1.69E-05	---	---
4/20/16	DC1	120	329,810	35.81	0.041	0.015	3.02E-06	1.10E-06	---	---
4/21/16	UF2	220	280,613	14.90	0.512	0.086	5.81E-05	9.81E-06	---	---
4/25/16	UF3	250	252,181	13.95	0.081	0.011	3.50E-06	4.67E-07	---	---
4/26/16	SD1	290	39,509	84.72	2.261	0.040	---	---	---	---
4/27/16	N1	300	1,491,009	26.17	0.037	0.025	2.46E-05	1.61E-05	2.92E-03	1.92E-03
4/29/16	H7.3	240	119,062	23.47	0.450	0.030	5.63E-06	3.69E-07	---	---
5/3/16	H7.2	250	94,775	62.35	0.035	0.002	1.82E-05	9.12E-07	---	---
5/4/16	SD3	120	26,712	31.80	0.575	0.017	2.64E-03	7.78E-05	---	---

Summary of Results - SD2

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: SD2
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/18/16
Sampling Time (min)	105.0
Start Time	12:43
Stop Time	14:28
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	70.7
Average Wet Bulb Temperature (°F)	49.8
Humidity (lb/lb air)	0.0042
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.20
Absolute Stack Pressure (P_s - "Hg)	24.91
Average Stack Temperature (T_s - °R)	599.1
Stack Moisture (B_{ws} - %)	4.150
Dry Gas Fraction (1-B_{ws})	0.9585
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_s - lbs/lb-mole)	28.402
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	89.01
Stack Velocity (v_s - F/M)	5340.60
Stack Flow, wet (Q_a - ACF/S)	17.47
Stack Flow, wet (Q_a - ACF/M)	1,048.09
Stack Flow, dry (Q_s - SCF/M)	737.06
Stack Flow, dry (Q_s - SCF/H)	44,224
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	78.428
Volume of DGM Sample (Vm_{std} - L)	1829.472
Corrected Metered Volume (DSCF)	64.858
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	86.28
TSP Data	
Rinse Mass (mg)	25.70
Filter Mass (mg)	0.20
Total Mass Collected (mg)	25.90
TSP Concentration (mg/DSCF)	0.399
TSP (lbs/hr)	***0.022***
TSP (tpy)	***0.097***
Pb Data	
Impinger Conentration (mg/L)	0.0081
Collected Volume (mL)	375
Impinger Mass (mg)	0.0030
Filter Mass (mg)	0.0551
Total Mass Collected (mg)	0.0581
Pb Concentration (mg/SCF)	8.96E-04
Pb (lbs/hr)	***4.99E-05***
Pb (tpy)	***2.19E-04***

Summary of Results - DC2 First Run

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: DC2 - First Run
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/19/16
Sampling Time (min)	120.0
Start Time	11:00
Stop Time	13:05
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	70.7
Average Wet Bulb Temperature (°F)	49.8
Humidity (lb/lb air)	0.0042
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.35
Absolute Stack Pressure (P_s - "Hg)	24.90
Average Stack Temperature (T_s - °R)	545.3
Stack Moisture (B_{ws} - %)	1.8962
Dry Gas Fraction (1-B_{ws})	0.9810
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.646
Stack Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	53.20
Stack Velocity (v_s - F/M)	3191.81
Stack Flow, wet (Q_a - ACF/S)	227.36
Stack Flow, wet (Q_a - ACF/M)	13,641.45
Stack Flow, dry (Q_s - SCF/M)	10,782.00
Stack Flow, dry (Q_s - SCF/H)	646,920
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	67.701
Volume of DGM Sample (Vm_{std} - L)	1582.539
Corrected Metered Volume (DSCF)	56.019
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	97.08
TSP Data	
Rinse Mass (mg)	9.6
[A]Filter Mass (mg)	0.0
Total Mass Collected (mg)	9.6
TSP Concentration (mg/SCF)	0.171
TSP (lbs/hr)	***0.122***
TSP (tpy)	***0.535***
Pb Data	
Impinger Conentration (mg/L)	0.011
Collected Volume (mL)	353
Impinger Mass (mg)	0.0039
Filter Mass (mg)	0.0007
Total Mass Collected (mg)	0.0046
Pb Concentration (mg/SCF)	8.18E-05
Pb (lbs/hr)	***5.83E-05***
Pb (tpy)	***2.56E-04***

A - Total Filter Mass was -0.2 mg, assumption - no collection.

Summary of Results - DC2 Second Run

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: DC2 - Second Run
Production Capacity:
Production Rate:
Load:

Test Run Number	***2***
Date	4/19/16
Sampling Time (min)	120.0
Start Time	15:40
Stop Time	17:43
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	65.7
Average Wet Bulb Temperature (°F)	48.6
Humidity (lb/lb air)	0.0047
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.35
Absolute Stack Pressure (P_s - "Hg)	24.90
Average Stack Temperature (T_s - °R)	552.5
Stack Moisture (B_{ws} - %)	0.8066
Dry Gas Fraction (1-B_{ws})	0.9919
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.764
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	56.19
Stack Velocity (v_s - F/M)	3371.12
Stack Flow, wet (Q_a - ACF/S)	11,365
Stack Flow, wet (Q_a - ACF/M)	240.13
Stack Flow, dry (Q_s - SCF/M)	14,408
Stack Flow, dry (Q_s - SCF/H)	681,889
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	75.746
Volume of DGM Sample (Vm_{std} - L)	1757.542
Corrected Metered Volume (DSCF)	62.227
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	102.30
TSP Data	
Rinse Mass (mg)	4.3
Filter Mass (mg)	0.6
Total Mass Collected (mg)	4.9
TSP Concentration (mg/DSCF)	0.079
TSP (lbs/hr)	***0.059***
TSP (tpy)	***0.259***
Pb Data	
[B]Impinger Conentration (mg/L)	0.0
Collected Volume (mL)	357
Impinger Mass (mg)	0.0000
Filter Mass (mg)	0.0014
Total Mass Collected (mg)	0.0014
Pb Concentration (mg/SCF)	2.25E-05
Pb (lbs/hr)	***1.69E-05***
Pb (tpy)	***7.41E-05***

B - Pb concentration was below detection limit of sample.

Summary of Results - DC1

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: DC1
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/20/16
Sampling Time (min)	120.0
Start Time	11:00
Stop Time	13:07
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	70.7
Average Wet Bulb Temperature (°F)	49.8
Humidity (lb/lb air)	0.0042
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.20
Absolute Stack Pressure (P_s - "Hg)	24.91
Average Stack Temperature (T_s - °R)	535.0
Stack Moisture (B_{ws} - %)	0.8218
Dry Gas Fraction (1-B_{ws})	0.9918
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.763
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	35.81
Stack Velocity (v_s - F/M)	2148.39
Stack Flow, wet (Q_a - ACF/S)	112.43
Stack Flow, wet (Q_a - ACF/M)	6,745.94
Stack Flow, dry (Q_s - SCF/M)	5,496.83
Stack Flow, dry (Q_s - SCF/H)	329,810
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	80.795
Volume of DGM Sample (Vm_{std} - L)	1869.895
Corrected Metered Volume (DSCF)	66.256
Nozzle Diamter (ft^2)	3.41E-04
Isokinetic Rate (%)	92.58
TSP Data	
Rinse Mass (mg)	2.6
Filter Mass (mg)	0.1
Total Mass Collected (mg)	2.7
TSP Concentration (mg/DSCF)	0.041
TSP (lbs/hr)	***0.015***
TSP (tpy)	***0.065***
Pb Data	
[B]Impinger Conentration (mg/L)	0.0
Collected Volume (mL)	295
Impinger Mass (mg)	0.0000
Filter Mass (mg)	0.0002
Total Mass Collected (mg)	0.0002
Pb Concentration (mg/SCF)	3.02E-06
Pb (lbs/hr)	***1.10E-06***
Pb (tpy)	***4.81E-06***

B - Pb concentration was below detection limit of sample.

Summary of Results - UF2

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: UF2
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/21/16
*Sampling Time (min) - Total	220.0
Start Time	8:54
Stop Time	13:30
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	74.8
Average Wet Bulb Temperature (°F)	51.3
Humidity (lb/lb air)	0.0041
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	0.07
Absolute Stack Pressure (P_s - "Hg)	24.93
Average Stack Temperature (T_s - °R)	539.7
Stack Moisture (B_{ws} - %)	1.2827
Dry Gas Fraction (1-B_{ws})	0.9872
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.713
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	14.90
*Stack Velocity (v_s - F/M)	894.05
Stack Flow, wet (Q_a - ACF/S)	96.88
Stack Flow, wet (Q_a - ACF/M)	5,812.89
Stack Flow, dry (Q_s - SCF/M)	4,676.89
Stack Flow, dry (Q_s - SCF/H)	280,613
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	61.036
Volume of DGM Sample (Vm_{std} - L)	1408.389
Corrected Metered Volume (DSCF)	50.369
*Nozzle Diamter (ft^2) - Average	3.144E-04
Isokinetic Rate (%) - Average	101.28
TSP Data	
Rinse Mass (mg)	24.7
Filter Mass (mg)	1.1
Total Mass Collected (mg)	25.8
TSP Concentration (mg/DSCF)	0.512
TSP (lbs/hr)	***0.086***
TSP (tpy)	***0.379***
Pb Data	
Impinger Conentration (mg/L)	0.0053
Collected Volume (mL)	345
Impinger Mass (mg)	0.0018
Filter Mass (mg)	0.0011
Total Mass Collected (mg)	0.0029
Pb Concentration (mg/SCF)	5.81E-05
Pb (lbs/hr)	***9.81E-06***
Pb (tpy)	***4.30E-05***

* - Data is combined or averaged from two separate runs.

Summary of Results - UF3

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: UF3
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/25/16
Sampling Time (min)	250.0
Start Time	11:25
Stop Time	15:25
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	70.2
Average Wet Bulb Temperature (°F)	47.5
Humidity (lb/lb air)	0.0030
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.035
Absolute Stack Pressure (P_s - "Hg)	24.92
Average Stack Temperature (T_s - °R)	549.6
Stack Moisture (B_{ws} - %)	1.0228
Dry Gas Fraction (1-B_{ws})	0.9898
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.741
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	13.95
Stack Velocity (v_s - F/M)	837.15
Stack Flow, wet (Q_a - ACF/S)	88.44
Stack Flow, wet (Q_a - ACF/M)	5,306.68
Stack Flow, dry (Q_s - SCF/M)	4,203.02
Stack Flow, dry (Q_s - SCF/H)	252,181
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	70.256
Volume of DGM Sample (Vm_{std} - L)	1615.676
Corrected Metered Volume (DSCF)	57.119
Nozzle Diamter (ft^2)	3.41E-04
Isokinetic Rate (%)	101.14
TSP Data	
Rinse Mass (mg)	4.5
Filter Mass (mg)	0.1
Total Mass Collected (mg)	4.6
TSP Concentration (mg/DSCF)	0.081
TSP (lbs/hr)	***0.011***
TSP (tpy)	***0.047***
Pb Data	
[B]Impinger Conentration (mg/L)	0.0
Collected Volume (mL)	312
Impinger Mass (mg)	0.0000
Filter Mass (mg)	0.0002
Total Mass Collected (mg)	0.0002
Pb Concentration (mg/SCF)	3.50E-06
Pb (lbs/hr)	***4.67E-07***
Pb (tpy)	***2.05E-06***

B - Pb concentration was below detection limit of sample.

Summary of Results - SD1

Company: CTS Wireless
Location: Albuquerque, NM
Technician: JC, CF
Source: SD1
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/26/16
Sampling Time (min)	290.0
Start Time	9:20
Stop Time	14:10
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	60.4
Average Wet Bulb Temperature (°F)	48.4
Humidity (lb/lb air)	0.0058
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.07
Absolute Stack Pressure (P_s - "Hg)	24.92
Average Stack Temperature (T_s - °R)	625.0
Stack Moisture (B_{ws} - %)	6.1764
Dry Gas Fraction (1-B_{ws})	0.9382
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.182
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	84.72
Stack Velocity (v_s - F/M)	5083.06
Stack Flow, wet (Q_a - ACF/S)	16.63
Stack Flow, wet (Q_a - ACF/M)	997.55
Stack Flow, dry (Q_s - SCF/M)	658.48
Stack Flow, dry (Q_s - SCF/H)	39,509
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	198.061
Volume of DGM Sample (Vm_{std} - L)	4652.657
Corrected Metered Volume (DSCF)	164.859
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	88.88
TSP Data	
Rinse Mass (mg)	23.9
Impinger Catch (mg)	341.5
[A]Filter Mass (mg)	0.0
Total Mass Collected (mg)	365.4
TSP Concentration (mg/DSCF)	2.216
TSP (lbs/hr)	***0.040***
TSP (tpy)	***0.175***

A - Total Filter Mass was -0.6 mg, assumption - no collection.

Summary of Results - N1

Company: CTS Wireless
Location: Albuquerque, NM
Technician: JC, CF
Source: N1
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/27/16
Sampling Time (min)	300.0
Start Time	10:11
Stop Time	15:25
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	61.2
Average Wet Bulb Temperature (°F)	47.1
Humidity (lb/lb air)	0.0049
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.035
Absolute Stack Pressure (P_s - "Hg)	24.92
Average Stack Temperature (T_s - °R)	541.2
Stack Moisture (B_{ws} - %)	0.7518
Dry Gas Fraction (1-B_{ws})	0.9925
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_s - lbs/lb-mole)	28.770
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	26.17
Stack Velocity (v_s - F/M)	1570.03
Stack Flow, wet (Q_a - ACF/S)	513.53
Stack Flow, wet (Q_a - ACF/M)	30,811.87
Stack Flow, dry (Q_s - SCF/M)	24,850.14
Stack Flow, dry (Q_s - SCF/H)	1,491,009
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	166.906
Volume of DGM Sample (Vm_{std} - L)	3861.951
Corrected Metered Volume (DSCF)	136.408
Nozzle Diamter (ft^2)	3.41E-04
Isokinetic Rate (%)	105.40
TSP Data	
Rinse Mass (mg)	5.1
Filter Mass (mg)	0.0
Total Mass Collected (mg)	5.1
TSP Concentration (mg/DSCF)	0.037
TSP (lbs/hr)	***0.025***
TSP (tpy)	***0.108***
Pb Data	
Impinger Conentration (mg/L)	0.010
Collected Volume (mL)	265
Impinger Mass (mg)	0.0027
Filter Mass (mg)	0.0007
Total Mass Collected (mg)	0.0034
Pb Concentration (mg/SCF)	2.46E-05
Pb (lbs/hr)	***1.61E-05***
Pb (tpy)	***7.07E-05***
Ag Data	
Impinger Conentration (mg/L)	1.50
Collected Volume (mL)	265
Impinger Mass (mg)	0.3975
Filter Mass (mg)	0.0010
Total Mass Collected (mg)	0.3985
Ag Concentration (mg/SCF)	2.92E-03
Ag (lbs/hr)	***1.92E-03***
Ag (tpy)	***8.41E-03***

Method 1 - Traverse Point Layout Calculations - N1

10

Method 1/7E/PS-2 - Traverse Point Layout Calculations

Enter the required information in the appropriate row/columns and the spreadsheet will calculate the required number of traverse points and their locations on the probe/pitot tube.

Use Method 1 or Method 20 For the Non-Particulate Traverse? 1 = use M-1 Min. Traverse Pts. 20 = use M-20 Min. Traverse Pts.	Stack Layout	Stack + Port (in)	Port (in)	Stack ID (in)	Stack Radius (ft)	Stack Area (sq ft)	Distance from flow disturbance upstream **to** ports. **Distance (ft) Upstream (A)**	Distance from flow disturbance downstream **to** ports. **Distance (ft) Downstream (B)**	Distance from flow disturbance upstream to ports. Duct Diameters Upstream (A)	Distance from flow disturbance downstream to ports. Duct Diameters Downstream (B)	Meets Method 1 Min. Distance Criteria?	**Method 1 Calculated Min. No. of Traverse Points**	Total # of DIAMETERS Traversed	**Traverse Points per DIAMETER**
Method	**CIRCULAR**	*see Flow Disturbance Diagram below*												
1	Non-Particulate								#DIV/0!	#DIV/0!	**#DIV/0!**	**#DIV/0!**	2	**#DIV/0!**
	Particulate	65.5	5.5	60	2.50	19.63	13.33	12.08	2.67	2.4	**YES**	**24**	2	**12**
NON-PARTICULATE MATTER ONLY!	**RECTANGULAR**	Port (in)	**Length (in)	Width (in)	Eq. Diameter (in)	***Distances in feet***							Rectangular Matrix Layout	
	Non-Particulate				#DIV/0!				#DIV/0!	#DIV/0!	**#DIV/0!**	**#DIV/0!**	x	**#DIV/0!**
	Particulate				#DIV/0!				#DIV/0!	#DIV/0!	**#DIV/0!**	**#DIV/0!**		**#DIV/0!**

NOTE: If needed, you can override the calculation of # of traverse points for rectangular stacks in order to achieve an appropriate matrix.

Method 1

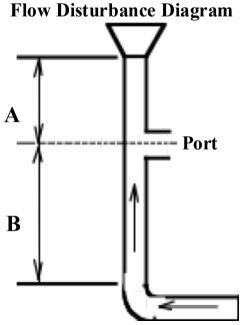
Circular Traverse Point Layout

Traverse Point Number	Non-Particulate: Traverse Pt. Location (in)	Non-Particulate: Traverse Pt. Location + Port (in)	Non-Particulate: *Distance from Stack Wall	Particulate: Traverse Pt. Location (in)	Particulate: Traverse Pt. Location + Port (in)	Particulate: *Distance from Stack Wall
1	#REF!	#REF!	**#REF!**	1.26	**6.76**	
2	#REF!	#REF!	**#REF!**	4.02	**9.52**	
3	#REF!	#REF!	**#REF!**	7.08	**12.58**	
4	#REF!	#REF!	**#REF!**	10.62	**16.12**	
5	#REF!	#REF!	**#REF!**	15.00	**20.50**	
6	#REF!	#REF!	**#REF!**	21.36	**26.86**	
7	#REF!	#REF!	**#REF!**	38.64	**44.14**	
8	#REF!	#REF!	**#REF!**	45.00	**50.50**	
9	#REF!	#REF!	**#REF!**	49.38	**54.88**	
10	#REF!	#REF!	**#REF!**	52.92	**58.42**	
11	#REF!	#REF!	**#REF!**	55.98	**61.48**	
12	#REF!	#REF!	**#REF!**	58.74	**64.24**	
13	#REF!	#REF!	**#REF!**		5.50	
14	#REF!	#REF!	**#REF!**		5.50	
15	#REF!	#REF!	**#REF!**		5.50	
16	#REF!	#REF!	**#REF!**		5.50	
17	#REF!	#REF!	**#REF!**		5.50	
18	#REF!	#REF!	**#REF!**		5.50	
19	#REF!	#REF!	**#REF!**		5.50	
20	#REF!	#REF!	**#REF!**		5.50	
21	#REF!	#REF!	**#REF!**		5.50	
22	#REF!	#REF!	**#REF!**		5.50	
23	#REF!	#REF!	**#REF!**		5.50	
24	#REF!	#REF!	**#REF!**		5.50	

*Correct traverse point distances that are too close to stack wall. Select a minimum of 1.0" or 0.5" for stack IDs of >24" and ≤24", respectively.

Note: If traversing large diameter, 4-port stacks with a short probe, simply mark the probe with the first half of the traverse points and traverse each of the 4 ports (which equals the total # of traverse pts.).

Flow Disturbance Diagram



Method 1

****Rectangular Traverse Point Layout**

Traverse Point Number	Non-Particulate: Traverse Pt. Location (in)	Non-Particulate: Traverse Pt. Location + Port (in)	Particulate: Traverse Pt. Location (in)	Particulate: Traverse Pt. Location + Port (in)
1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
3	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
4	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
7	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

** Caution- Make sure that the Length of the stack corresponds to the side of the stack which is traversed!

CIRCULAR STACK- 40CFR60, App. B, PS2 Traverse Point Locations

Traverse Point Number	Diameter Traverse (16.4,50,83.3%): Traverse Pt. Location (in)	Diameter Traverse (16.4,50,83.3%): Traverse Pt. Location + Port (in)	"Short" Line Traverse (.4,1.2,2.0m): Traverse Pt. Location (in)	"Short" Line Traverse (.4,1.2,2.0m): Traverse Pt. Location + Port (in)
1			req. not met	#VALUE!
2			req. not met	#VALUE!
3			req. not met	#VALUE!

RECTANGULAR STACK- 40CFR60, App. B, PS2 Traverse Point Locations

Traverse Point Number	Length Traverse (16.4,50,83.3%): Traverse Pt. Location (in)	Length Traverse (16.4,50,83.3%): Traverse Pt. Location + Port (in)	"Short" Line Traverse (.4,1.2,2.0m): Traverse Pt. Location (in)	"Short" Line Traverse (.4,1.2,2.0m): Traverse Pt. Location + Port (in)
1			req. not met	#VALUE!
2			req. not met	#VALUE!
3			req. not met	#VALUE!

** Caution- Make sure that the Length of the stack corresponds to the side of the stack which is traversed!

Isokinetic Worksheet - N1

Date:	4/27/16
Client:	CTS
Plant:	ABQ
Emission Source:	N1
Technicians:	JC, CF
DGM No:	Console 1
DGM Factor, Y:	0.971
ΔH@:	1.634
Stack Diameter (''):	60
Stack Area (ft^2):	19.63

Critical Isokinetic Test Data	
Atmosph. Press.("Hg)	24.92
Pitot Tube Factor, Cp	0.84
Static Pressure (in H2O),Pg	-0.035
M_S - Molecular Weight (lb/lb-mole)	28.77
Dry Gas Fraction, 1-Bws	0.9925
Nozzle Diamter (in)	0.250
Nozzle Area (ft^2)	3.41E-04
Total Sample Time (min)	300
Number of Points	24
Filter #	Pb 3

Pre-Test Calibration Check		
Vi	27.348	cf
Vf	35.665	cf
Vt	8.317	cf
ΔH	1.63	"H20
Time	10	min
Tm	516	R
Pbar	24.92	"Hg
constant	0.0319	"Hg-cfm/R
Yc	**0.9772**	
ΔH@	**1.6549**	

Dry Gas Meter Leak Checks			*Pitot Tube Leak Check*	
pre-test	**0.000 cf @**	**7''**	+/-	**9.9/8.4—**
post-test	**0.000 cf @**	**7''**	+/-	**8.4/7.2**

Moisture Data					
Run 1	*80 mL*	*106 mL*	*Impinger 3*	*Impinger 4*	*Total Wt*
Beginning	712.3	692.9	594.4	943.9	**2943.5**
Ending	688	698.5	599.2	979.7	**2965.4**
Total	-24.3	5.6	4.8	35.8	**21.9**

Gaseous Data (%)					
O2	20.9	*CO2*	0.10	*N2*	79.0

BG Nozzle Number	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Nozzle Diameter (in.)	0.125	0.187	0.250	0.312	0.375	0.437	0.500
Nozzle Cross Sectional Area (ft2)	0.000085	0.000191	0.000341	0.000531	0.000767	0.001042	0.001364

*** meterbox leak check = less than 0.02 cfm at 15 in. Hg or greatest vacuum observed during test.**

† pitot tube leak check = hold 3 in. H_2O for at least 15 sec.

$\Delta H = \Delta P \times$ K factor $\times$ $[(T_{dgm} + 460)/528]$

Sample Time per Point:	12.5	*Desired K Factor:*	1.0	*Isokinetic Rate (%):*	105.40

Sample Point per Port	*Start Meter Time*	*Observed Meter Reading (ft^3)*	*Next Point Target (ft^3)*	*ΔP ("H2O)*	*ΔH ("H2O)*	*Observed K Factor*	*Sample Vacuum ("Hg)*	*DGM Temp. (°F)*	*Last Imp. (°F)*	*Filter Temp. (°F)*	*Probe Temp. (°F)*	*Stack Temp. (°F)*	*Point Vol Sampled (DSCF)*	*Σ - √ΔP ("H2O)*	*Stack Velocity (ft/s)*	*ISO at Point (%)*	*Average ISO (%)*
1	0.00	37.221	43.783	0.17	0.13	0.77	0.0	66	37	175	235	76	5.668	0.412	25.60	106.4	106.4
2	12.50	44.200	50.964	0.18	0.18	1.00	0.0	67	38	191	236	76	5.595	0.424	26.34	102.0	104.2
3	25.00	51.100	57.519	0.16	0.20	1.24	0.0	71	39	208	235	77	5.794	0.400	24.86	112.2	106.7
4	37.50	58.300	64.744	0.16	0.18	1.11	0.0	73	39	234	242	77	5.211	0.400	24.86	100.9	105.3
5	50.00	64.800	71.057	0.15	0.17	1.12	0.0	75	40	244	242	78	5.071	0.387	24.09	101.5	104.6
6	62.50	71.150	77.424	0.15	0.17	1.12	0.0	76	40	245	240	77	5.022	0.387	24.07	100.4	103.9
7	75.00	77.450	83.948	0.16	0.18	1.10	0.0	78	40	248	242	78	5.957	0.400	24.88	115.4	105.5
8	87.50	84.950	92.037	0.19	0.21	1.08	0.0	79	41	250	237	79	4.995	0.436	27.14	88.9	103.3
9	100.00	91.250	99.011	0.23	0.25	1.07	0.0	77	41	246	242	80	6.566	0.480	29.89	106.3	103.7
10	112.50	99.500	107.435	0.24	0.26	1.06	0.0	78	42	243	242	81	7.070	0.490	30.56	112.2	104.7
11	125.00	108.400	115.611	0.20	0.22	1.08	0.0	76	43	242	243	82	6.139	0.447	27.92	106.8	104.9
12	137.50	116.100	123.509	0.21	0.23	1.08	0.0	77	51	242	243	81	5.690	0.458	28.59	96.5	104.1
13	150.00	123.250	128.878	0.12	0.13	1.06	0.0	80	39	233	243	82	4.707	0.346	21.63	105.7	104.2
14	162.50	129.200	134.823	0.12	0.13	1.06	0.0	80	44	243	243	83	4.866	0.346	21.65	109.4	104.5
15	175.00	135.350	141.186	0.13	0.14	1.05	0.0	79	45	242	241	84	4.954	0.361	22.55	107.1	104.7
16	187.50	141.600	147.218	0.12	0.13	1.06	0.0	80	46	249	242	84	4.707	0.346	21.67	105.9	104.8
17	200.00	147.550	153.163	0.12	0.13	1.06	0.0	80	45	240	243	85	4.668	0.346	21.69	105.1	104.8
18	212.50	153.450	159.286	0.13	0.20	1.50	0.0	80	45	243	242	86	4.788	0.361	22.59	103.7	104.7
19	225.00	159.500	166.180	0.17	0.19	1.09	0.0	81	45	244	244	87	5.568	0.412	25.86	105.5	104.8
20	237.50	166.550	173.611	0.19	0.21	1.08	0.0	80	46	242	248	85	5.856	0.436	27.29	104.8	104.8
21	250.00	173.950	182.070	0.25	0.28	1.09	0.0	81	47	240	242	84	6.692	0.500	31.28	104.3	104.7
22	262.50	182.420	190.866	0.27	0.30	1.08	0.0	81	49	242	239	83	7.253	0.520	32.47	108.7	105.0
23	275.00	191.600	199.563	0.23	0.25	1.04	0.0	92	51	240	243	82	6.906	0.480	29.94	112.0	105.3
24	287.50	200.520	208.646	0.24	0.26	1.04	0.0	91	54	243	243	81	6.665	0.490	30.56	105.7	105.3
Finish	300.00	209.112	---	---	---	---	---	---	---	---	---	---	*Sum*	*Sum*	---	---	---
	Total	**171.891**	*Average*	**0.179**	**0.197**	**1.086**	**0.00**	**78.3**	**43.6**	**236.2**	**241.3**	**81.2**	**136.4079**	**10.0661**	**26.166**	**105.31**	**104.79**

Moisture Content Determination

Moisture Content via EPA Method 4 - Unit N1

V_1	=	Initial dry gas meter reading	=	37.221	ft3
V_2	=	Final dry gas meter reading	=	209.112	ft3
V_M	=	Total cubic meters of stack gas metered (V_2-V_1)	=	**171.891**	**ft3**
Y	=	Dry gas meter correction factor	=	0.9710	unitless
$V_{M\,(corr)}$	=	Corrected DGM volume to cubic feet (V_M x Y)	=	**166.906**	**ft3**
W_I	=	Initial weight of impinger train	=	2943.5	grams
W_F	=	Final weight of impinger train	=	2965.4	grams
W_{TOT}	=	Total weight gain of impinger train (W_F-W_I)	=	**21.9**	**grams**
K_1	=	Conversion factor	=	1.333	L_{H20}
1 m3/mL	=	Conversion factor	=	1 x e 6	
DH_20	=	Density of water	=	998.2	L/g
K1A	=	Conv. factor x density of water @ EPA STP	=	1.336	L/g
K_3	=	$\frac{528°R \times 28.316\ L/ft3}{29.92\ "Hg}$ @ EPA STP	=	499.7	$\frac{°R - L}{"Hg\text{-}ft3}$
P_{ATM}	=	Atmospheric Pressure	=	**24.92**	**"Hg**
T °F	=	Average temperature of dry gas meter	=	78.25	°F
T °R	=	Avg. temperature of dry gas meter + 460°	=	**538.25**	**°R**

Formulas and Calculations (Equation 4-4)

$V_{M\,(std)}$ = Volume of gas metered @ EPA STP = $\left(\frac{V_{Mcorrected} x P_{atm} x K_3}{°R}\right)$

$V_{M\,(std)}$ = $\frac{166.906 \times 24.92 \times 499.7}{538.25}$ @ EPA STP = **3861.951 L**

B_{WS} = Moisture content by volume = $\left(\frac{W_{tot} x K_2}{(W_{tot} x K_{2)} + V_{M\,(std)}}\right)$

B_{WS} = $\frac{(21.90 \times 1.336)}{(21.90 \times 1.336) + 3861.95}$ = 0.007518

x 100 = **0.7518% Moisture**

Stack Gas Molecular Weight

MW_{H20}	=	Molecular weight of water	=	18	lb/lb-mol
MW_{O2}	=	Molecular weight of oxygen	=	32	lb/lb-mol
MW_{CO2}	=	Molecular weight of carbon dioxide	=	44	lb/lb-mol
MW_{N2}	=	Molecular weight of nitrogen	=	28	lb/lb-mol
C_{O2}	=	Volume fraction of corrected oxygen	=	0.2090	O2
C_{CO2}	=	Volume fraction of corrected carbon dioxide	=	0.0010	CO2
C_{N2}	=	Volume fraction of nitrogen = 1-(C_{O2} + C_{CO2})	=	0.7900	N2
1-B_{WS}	=	Dry gas fraction = (1 - B_{WS})	=	0.9925	Dry Exhaust

Formulas and Calculations (Equations 3-1 and 2-5)

M_S = Wet molecualr weight of stack gas lb/lb-mol

M_D = Dry molecular weight of stack gas lb/lb-mol

M_D = (MW_{O2} x C_{O2}) + (MW_{CO2} x C_{CO2}) + (MW_{N2} x C_{N2})

= 6.688 + 0.044 + 22.120 = **28.852 lb/lb-mol**

M_S = (18 x B_{WS}) + [(1-B_{WS}) x M_D]

= 0.135 + 28.635 = **28.770 lb/lb-mol**

Example Calculations

Stack Gas Velocity Determination

Velocity and stack flow rate via Pitot tube (Equations 2-6, 2-8, 2-9, 2-10) - Unit N1

C_P	=	S-Type pitot tube coefficient (dimensionless)	=	0.84	
DP	=	Pressure difference in stack as measured by pitot tube			
$(\sqrt{DP})_{avg}$	=	Average of square root of ΔP's	=	**0.42**	**"H20**
$T_{S-°F}$	=	Average stack temperature (measured)	=	81.2	°F
$T_{S-°R}$	=	Absolute stack temperature (°R) = (T_S + 460)	=	**541.2**	**°R**
K_P	=	Pitot tube constant in seconds $\sqrt{\left(\frac{lb/lb \bullet mole \times "Hg}{°R \times "H_2O}\right)}$	=	85.49	ft/sec
K_P	=	Pitot tube constant in minutes $\sqrt{\left(\frac{lb/lb \bullet mole \times "Hg}{°R \times "H_2O}\right)}$	=	5129.4	ft/min
K_Y	=	Standard pressure/temperature coefficient			
	=	$\frac{528°R}{29.92"Hg}$ x $\frac{60\,minutes}{hour}$	=	1058.8	$\frac{°R\text{-}min}{"Hg\text{-}hr}$
P_B	=	Atmospheric pressure ("Hg)	=	**24.92**	**"Hg**
P_G	=	Stack static pressure ("H2O)	=	**-0.035**	**"H20**
P_S	=	Absolute stack pressure			
	=	$P_B + \frac{P_G}{13.6\ ("H2O/"Hg)}$	=	24.92	"Hg
D	=	Stack Diameter	=	**60**	**inches**
A_S	=	Area of stack (ft2) = $\frac{\frac{diameter^2}{4} x\pi}{144 in^2/ft^2}$	=	19.63	ft2
V_S	=	Stack velocity (ft/min)			
	=	K_P x C_P x $(\sqrt{DP})_{avg}$ x $\sqrt{\frac{T_S}{P_S x M_S}}$			
V_S	=	71.8116 x 0.42 $\sqrt{\frac{541}{716.97}}$	=	1570.03	ft/min
Q_A	=	Stack flow rate = V_S x A_S	=	30811.87	ACFM
Q_D	=	Stack flow rate on a dry basis and standard conditions			
	=	Q_A x K_Y x (1-B_{WS}) x $\frac{P_S}{T_S}$			
Q_D	=	30811.87 x 1050.8 x $\frac{24.92}{541.2}$	=	**1,491,009**	**DSCFH**

Example Calculations

Calculated Emissions

Measured Data and Constants - Unit N1

$Q_{S\ M1-4}$ =	Measured Stack Flow Rate	=	1,491,009	SCF/H Dry
V_{M-DRY} =	Dry Standard Metered Volume	=	136.408	SCF Dry
lbs / hr to tpy =	Mass Conversion Factor	=	4.38	hrs-tons / lbs-yr
C_{F2} =	Conversion from mg to g	=	1.00E-03	mg/g
C_{F3} =	Conversion from g to lbs	=	2.2046E-03	lbs/g
Sample Time =	Total Sampling Time	=	300	min
C_{F4} =	Conversion from sample time to hr	=	0.2000	per hr
TSP Mass =	Mass of TSP Collected	=	5.10	mg
Pb Mass =	Mass of Pb Collected	=	0.0034	mg
Ag Mass =	Mass of Ag Collected	=	0.3985	mg

Determination of TSP, Pb, & Ag Concentrations

$$\textbf{Concentration (mg/SCF)} = \frac{\textbf{mass collected (mg)}}{\textbf{V}_{\textbf{M-DRY}}\ \textbf{(SCF)}}$$

$$\textbf{TSP}_{\textbf{CONC}} = \frac{5.1}{136.408} = 0.037 \text{ mg/SCF}$$

$$\textbf{Pb}_{\textbf{CONC}} = \frac{0.0034}{136.408} = 2.46\text{E-05} \text{ mg/SCF}$$

$$\textbf{Ag}_{\textbf{CONC}} = \frac{0.3985}{136.408} = 2.92\text{E-03} \text{ mg/SCF}$$

Calculated TSP, Pb, & Ag Emissions

Mass Emissions (lbs/hr) = E CONC x CF2 x CF3 x CF4 x Stack Flow Rate (SCFH)

$$\textbf{TSP}_{\textbf{lbs/hr}} = 0.037 \times 4.41\text{E-07} \times 1.49\text{E+06} = \mathbf{0.025}\ \textbf{lbs/hr}$$

$$\textbf{TSP}_{\textbf{tpy}} = 0.025 \text{ lb/hr} \times 4.38 \frac{\text{hrs-ton}}{\text{lbs-yr}} = \mathbf{0.108}\ \textbf{tpy}$$

$$\textbf{Pb}_{\textbf{lbs/hr}} = 2.46\text{E-05} \times 4.41\text{E-07} \times 1.49\text{E+06} = \mathbf{1.61\text{E-05}}\ \textbf{lbs/hr}$$

$$\textbf{Pb}_{\textbf{tpy}} = 1.61\text{E-05} \text{ lbs/hr} \times 4.38 \frac{\text{hrs-ton}}{\text{lbs-yr}} = \mathbf{7.07\text{E-05}}\ \textbf{tpy}$$

$$\textbf{Ag}_{\textbf{lbs/hr}} = 2.92\text{E-03} \times 4.41\text{E-07} \times 1.49\text{E+06} = \mathbf{1.92\text{E-03}}\ \textbf{lbs/hr}$$

$$\textbf{Ag}_{\textbf{tpy}} = 1.92\text{E-03} \text{ lbs/hr} \times 4.38 \frac{\text{hrs-ton}}{\text{lbs-yr}} = \mathbf{8.41\text{E-03}}\ \textbf{tpy}$$

Summary of Results - H7.3

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, CF
Source: H7.3
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	4/29/16
Sampling Time (min)	240.0
Start Time	10:00
Stop Time	14:00
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	60.4
Average Wet Bulb Temperature (°F)	48.2
Humidity (lb/lb air)	0.0057
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.07
Absolute Stack Pressure (P_s - "Hg)	24.92
Average Stack Temperature (T_s - °R)	540.0
Stack Moisture (B_{ws} - %)	2.0900
Dry Gas Fraction (1-B_{ws})	0.9791
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.625
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	23.47
Stack Velocity (v_s - F/M)	1408.45
Stack Flow, wet (Q_a - ACF/S)	41.48
Stack Flow, wet (Q_a - ACF/M)	2,488.94
Stack Flow, dry (Q_s - SCF/M)	1,984.36
Stack Flow, dry (Q_s - SCF/H)	119,062
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	64.781
Volume of DGM Sample (Vm_{std} - L)	1508.040
Corrected Metered Volume (DSCF)	53.288
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	103.73
TSP Data	
Rinse Mass (mg)	23.20
Filter Mass (mg)	0.80
Total Mass Collected (mg)	24.00
TSP Concentration (mg/DSCF)	0.450
TSP (lbs/hr)	***0.030***
TSP (tpy)	***0.129***
Pb Data	
[B]Impinger Conentration (mg/L)	0.0
Collected Volume (mL)	420
Impinger Mass (mg)	0.0000
Filter Mass (mg)	0.0003
Total Mass Collected (mg)	0.0003
Pb Concentration (mg/SCF)	5.63E-06
Pb (lbs/hr)	***3.69E-07***
Pb (tpy)	***1.62E-06***

B - Pb concentration was below detection limit of sample.

Summary of Results - H7.2

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, FC
Source: H7.2
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	5/3/16
Sampling Time (min)	250.0
Start Time	10:27
Stop Time	14:37
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	70.3
Average Wet Bulb Temperature (°F)	50.9
Humidity (lb/lb air)	0.0049
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.30
Absolute Stack Pressure (P_s - "Hg)	24.90
Average Stack Temperature (T_s - °R)	563.6
Stack Moisture (B_{ws} - %)	0.6666
Dry Gas Fraction (1-B_{ws})	0.9933
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.780
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	62.35
Stack Velocity (v_s - F/M)	3741.28
Stack Flow, wet (Q_a - ACF/S)	33.99
Stack Flow, wet (Q_a - ACF/M)	2,039.52
Stack Flow, dry (Q_s - SCF/M)	1,579.59
Stack Flow, dry (Q_s - SCF/H)	94,775
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	162.629
Volume of DGM Sample (Vm_{std} - L)	3742.126
Corrected Metered Volume (DSCF)	132.581
Nozzle Diamter (ft^2)	1.91E-04
Isokinetic Rate (%)	96.02
TSP Data	
Rinse Mass (mg)	4.60
Filter Mass (mg)	0.00
Total Mass Collected (mg)	4.60
TSP Concentration (mg/DSCF)	0.035
TSP (lbs/hr)	***0.002***
TSP (tpy)	***0.008***
Pb Data	
Impinger Conentration (mg/L)	0.0067
Collected Volume (mL)	315
Impinger Mass (mg)	0.0021
Filter Mass (mg)	0.0003
Total Mass Collected (mg)	0.0024
Pb Concentration (mg/SCF)	1.82E-05
Pb (lbs/hr)	***9.12E-07***
Pb (tpy)	***3.99E-06***

Summary of Results - SD3

Company: CTS Wireless
Location: Albuquerque, NM
Technician: CS, GC
Source: SD3
Production Capacity:
Production Rate:
Load:

Test Run Number	***1***
Date	5/4/16
Sampling Time (min)	120.0
Start Time	11:50
Stop Time	13:40
Constants	
Constant K_{1A} (L / g)	1.336
Constant K_3 (°R-L / "Hg-cf)	499.7
Conversion Factor ("Hg / "H2O)	0.07355
Pitot Tube Constant K_p (√(lb/lb.mol-"Hg/°R-"H20)	5129.4
STP / Time Constant K_y (°R-min / "Hg-hr)	1058.8
Ambient Conditions	
Pressure Altitude (MSL)	5000
Atmospheric Pressure ("Hg)	24.92
Average Dry Bulb Temperature (°F)	76.2
Average Wet Bulb Temperature (°F)	52.1
Humidity (lb/lb air)	0.0042
Stack Parameters	
Static Stack Pressure (P_g - "H2O)	-0.10
Absolute Stack Pressure (P_s - "Hg)	24.92
Average Stack Temperature (T_s - °R)	611.1
Stack Moisture (B_{ws} - %)	7.0352
Dry Gas Fraction (1-B_{ws})	0.9296
Dry Stack Gas Molecular Wt. (M_D - lbs/lb-mole)	28.852
Wet Stack Gas Molecular Wt. (M_S - lbs/lb-mole)	28.089
Stack Velocity and Flow Rate via Pitot Tube	
Stack Velocity (v_s - F/S)	31.80
Stack Velocity (v_s - F/M)	1907.76
Stack Flow, wet (Q_a - ACF/S)	11.09
Stack Flow, wet (Q_a - ACF/M)	665.60
Stack Flow, dry (Q_s - SCF/M)	445.20
Stack Flow, dry (Q_s - SCF/H)	26,712
Dry Gas Meter Sampling Data	
Corrected Metered Volume ($Vm_{corrected}$ - CF)	61.196
Volume of DGM Sample (Vm_{std} - L)	1401.476
Corrected Metered Volume (DSCF)	49.606
Nozzle Diamter (ft^2)	3.41E-04
Isokinetic Rate (%)	95.09
TSP Data	
Rinse Mass (mg)	27.0
Filter Mass (mg)	1.5
Total Mass Collected (mg)	28.5
TSP Concentration (mg/DSCF)	0.575
TSP (lbs/hr)	***0.017***
TSP (tpy)	***0.074***
Pb Data	
[B]Impinger Conentration (mg/L)	0.0
Collected Volume (mL)	440
Impinger Mass (mg)	0.0
Filter Mass (mg)	0.131
Total Mass Collected (mg)	0.131
Pb Concentration (mg/SCF)	2.64E-03
Pb (lbs/hr)	***7.78E-05***
Pb (tpy)	***3.41E-04***

B - Pb concentration was below detection limit of sample.

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

Supporting Information

AP-42 Natural Gas External Combustion EPA Emission Factors

1.4 Natural Gas Combustion

1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and NO_x control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some NO_x control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), volatile organic compounds (VOCs), trace amounts of sulfur dioxide (SO_2), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of NO_x formation in natural gas combustion is thermal NO_x. The thermal NO_x mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NO_x formed through the thermal NO_x mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NO_x is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, NO_x emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of NO_x formation, called prompt NO_x, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt NO_x reactions occur within the flame and are usually negligible when compared to the amount of NO_x formed through the thermal NO_x mechanism. However, prompt NO_x levels may become significant with ultra-low-NO_x burners.

The third mechanism of NO_x formation, called fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, NO_x formation through the fuel NO_x mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of NO_x control systems such as low NO_x burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of SO_2 from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO_2 emissions. Boilers combusting unprocessed natural gas may have higher SO_2 emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine SO_2 emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-9]

CO_2, CH_4, and N_2O emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to CO_2 results in CH_4, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of CH_4, CO, and VOC produced is insignificant compared to CO_2 levels.

Formation of N_2O during the combustion process is affected by two furnace-zone factors. N_2O emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of N_2O also favor emissions of methane.

1.4.4 Controls[4,10]

NO_x Controls -

Currently, the two most prevalent combustion control techniques used to reduce NO_x emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low NO_x burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces NO_x emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal NO_x mechanism. To a lesser extent, FGR also reduces NO_x formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing NO_x emission rates for these systems. An FGR system is normally used in combination with specially designed low NO_x burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low NO_x burners and FGR are used in combination, these techniques are capable of reducing NO_x emissions by 60 to 90 percent.

Low NO_x burners reduce NO_x by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO_x formation. The two most common types of low NO_x burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. NO_x emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low NO_x burners.

Other combustion control techniques used to reduce NO_x emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing NO_x emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of NO_x to NO_2.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce NO_x emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia (NH_3) or urea into combustion flue gases (in a specific temperature zone) to reduce NO_x emission. The Alternative Control Techniques (ACT) document for NO_x emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[12] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in NO_x for applications on wall-fired boilers and a 13 percent reduction in

NO_x for applications on tangential-fired boilers.[11] In many situations, a boiler may have an SNCR system installed to trim NO_x emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum NO_x reduction. The SCR system involves injecting NH_3 into the flue gas in the presence of a catalyst to reduce NO_x emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates NO_x reduction efficiencies for SCR control ranging from 80 to 90 percent.[12]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[11] Tables in this section present emission factors on a volume basis (lb/10^6 scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/10^6 scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how "good" the factor is, with "A" being excellent and "E" being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/ttn/chief).

Supplement D, March 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.
- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

July 1998 - minor changes

- Footnote D was added to table 1.4-3 to explain why the sum of individual HAP may exceed VOC or TOC, the web address was updated, and the references were reordered.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 \text{ scf}] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

Supporting Information

2014-2015 Air Emission Inventories

CTS ELECTRONIC COMPONENTS

March 13, 2015

Via email itavarez@cabq.gov and US Mail

Mr. Isreal Tavarez
AEHD/Air Quality Division
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: CTS 2014 Air Emissions Inventory

Dear Mr. Tavarez:

Please see the attached 2014 Air Emissions inventory for CTS Electronic Components Inc., Permit number 217-M5. Also included is CTS's emission inventory in excel format on disk.

If you have any questions please contact me at (505) 348-4230 or John Wakefield at (505) 348-4252. Thanks for your attention to this matter.

Sincerely,

Daniel Rodriguez
Plant Manager

cc: John Wakefield

4800 Alameda Blvd., N.E., Albuquerque, NM 87113 • (505) 348-3329 • (505) 348-4395

CTS Electronic Components

2014 Air Emissions Inventory

Index

- 2014 Emissions Inventory Summary Table
- List and number of stacks
- Emissions calculations for sources 1- 17
- Chemical usage

CTS Electronic Components

CTS 2014 Annual Emission Report Summary

Date: 3/10/15
File: fees.xls
From: J. Wakefield
Page: 1 of 1

Unit	CTS	NOx		SO2		CO		VOC		PM		Lead	
No.	Descrip.	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY
1	DC1									0.11	0.0859	0.0033	0.0026
2	DC2									0.09	0.026		
4	SD1	0.003	0.0009			0.5	0.15	0.0008	0.0003	0.06	0.018		
5	SD2							0.0006	0.0004	0.02	0.0136	0.0024	0.0016
6	SD3	0.003	0.0026			0.5	0.441	0.002	0.0018	0.02	0.018	0.0024	0.0021
7	N							1.45	3.12				
8	UF1									0.0014	0.0011	0.0009	0.0007
9	UF2									0.0014	0.0011	0.0009	0.0007
10	UF3									0.0014	0.0011	0.0009	0.0007
11a	NG boiler	0.217	0.474	0.001	0.003	0.182	0.399	0.012	0.026	0.016	0.036		
12	FUG							0.179	0.384				
2014	SUM	0.2230	0.4775	0.0010	0.003	1.1820	0.990	1.6445	3.5325	0.3203	0.2008	0.0107	0.0083

CTS Electronic Components

2014 Air Emissions Inventory

List of Stacks

CTS ID	CITY #	DESCRIPTION & LOCATION OF STACK	CONTROL EQUIPMENT
		PHASE 1	
IL1	13	Midsaw exhaust	Pre-filters, Wet Process
UF10	14	Centerless Grinding	Wet process
		PZT FOUNDRY PHASE I	
UF1	8	PZT Kiln exhaust	Filter series: Pre-filters, bag filters, HEPA filters.
UF2	9	PZT Lead Handling Room and Batching Room	Filter series: Pre-filters, bag filters, HEPA filters.
UF3	10	PZT Lead Batching Room	Filter series: Pre-filters, bag filters, HEPA filters.
DC1	1	PZT Powder Packing	Dust collector with efficiency cartridge filters (95% efficient).
SD2	5	PZT spray dryer, electric	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
SD3	6	PZT spray dryer, Nat Gas	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
		RF FOUNDRY PHASE I	
SD1	4	Spray dryer, gas fired (BT/Neo materials)	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
DC2	2	Batching exhaust – Dust Collector	Dust collector with efficiency cartridge filters (95% efficient).

ENTIRE FACILITY Common area equipment for entire site Phases 1, 2, 3 and 4. CTS operates just Phase 1.

N	7	Main NMHC stack, Phases I process equipment. Phase 2,3 and 4 no longer part of CTS operations	No VOC Control equipment on stack. Pre-filters or in-house dust collectors on all dust generating equipment exhausting inside the building.
C	11a	Phase 1 Facility boiler - All natural gas	No control equipment
	11b-f	Phase 2, 3 and 4 boilers Controlled by Property Owner	Not CTS equipment or CTS operations, No control equipment
	16	Emergency Generator Phase 2, Controlled by Property owner	Not CTS equipment or CTS operations, No control equipment
	17	Fire Pump Engine Controlled by Property owner	Removed from Service

2014 Air Emissions Inventory

STACK DC1 - BAG HOUSE FOR PZT POWDER PACKING –CITY # 1

Background

- Baghouse dust collector system efficiency = 95% — John says actually higher
- PZT powder is 60% lead 625 batches in 2014.
- Hours of operation = 625 batches x 2.5 hours per batch = 1562.5 hours
- Based on 1999 Stack test on DC-1 for PM and lead the following emissions are calculated.

PM and Lead Emissions:

- PM = 0.11 lbs./hr x 1562 hr = 172 lbs. of PM/year = 0.0859 tpy.
- Lead = 0.0033 lbs./hr x 1562 hr. = 5.2 lbs./year = 0.0026 tpy.

Permit Limits

- 1200 Batches per year
- 0.3 lbs./hr and 0.4 tpy PM
- Lead 0.01 lbs./hour and 0.02 tpy

CTS STACK- DUST COLLECTOR FOR EAST SIDE FOUNDRY DC2 - CITY # 2

Background

- The stated efficiency of the cartridges is 99% efficient.
- 117 batches were produced in the foundry in 2014. The dust collection system ran continuously. Five hours per batch processing time so for 117 batches total hours equals 585 hours.
- Based on 1999 DC-2 Stack test for PM the following emissions are calculated.

PM

- PM = 0.09 lbs./hr x 585 hr =52.6 lbs. of PM/year = 0.026 tpy.

Permit Limits

- 1300 Batches per year
- 0.8 lbs./hr PM
- 1.2 tpy PM

2014 Air Emissions Inventory

CTS STACK –SPRAY DRYER 1 (SD1)
CITY STACK # 4

Background

- Gas Spray Dryer East Side
- 117 batches in 2014 @ 5 hours per batch = 585 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device, the cyclone collects the majority of the powder that bypasses the spray dryer. This is returned to the process as product. Baghouse dust is collected as waste. Final capture device is the scrubber. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test we have emission rates for PM, CO and NOx.

PM

- PM = 0.06 lbs./hr x 585 hr = 35.1 lbs. of PM/year = 0.018 tpy.

VOC

- Polyethylene glycol (PEG 400), is used as a binder in our RF ceramic material and has a VOC content of 11 g/L.
- In 2014 used 254 lbs. PEG 400 in SD-1 Unit #4 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 254 lbs x 0.009693 lbs. VOC/1 lb PEG 200 (=11 grams VOC/1 liter PEG 200) = 2.46 lbs. VOC's discharged from SD-1. Utilizing the scrubber capture of 80% then VOC discharge from SD-1 = 2.46 lbs. VOC's - (.80 x 2.46 lbs. VOC's) = 0.49 lbs. VOC's lbs. per hour from SD-1 = 0.49 lbs./585 hr = 0.00084 lbs./hr. VOC's. Tons per year calculation is, 0.49 lbs./2000 =0.00025 tpy.
-

CO & NOx

- CO Test results on 8/99 - 0.5 lbs./hr
- 585 hours of operation X 0.5 lbs./hr =293 lbs. of CO or 0.15 tpy
- NO_x test results on 8/99 – 0.003 lbs./hr
- 585 hours of operation X 0.003 lbs./hr = 1.76 lbs. of NO_x or 0.00088 tpy

Permit Limits

- PM = 0.1 lbs./hr and 0.4 tpy
- VOC = 0.02 lbs./hr and 0.08 tpy
- CO = 1.0 lbs./hr and 1.0 tpy
- NOx = 0.01 lbs./hr and 0.03 tpy
- 1300 Batches per year

2014 Air Emissions Inventory

CTS STACK SPRAY DRYER 2 (SD2)
CITYSTACK # 5

Background

- Electric Spray Dryer
- 272 batches in 2014 @ 5 hours per batch = 1360 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device is the cyclone followed by the baghouse and then the scrubber. All of the collected particulates are treated as waste. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test we have emission rates for PM and lead.

PM and Lead

- PM = 0.02 lbs./hr x 1360 hr =27.2 lbs. of PM/year = 0.0136 tpy.
- Lead = 0.0024 lbs./hr x 1360 hr. = 3.26 lbs./year = 0.0016 tpy.

VOC & PEG-200

- Polyethylene glycol (PEG 200), is used as a binder in our PZT ceramic material and has a VOC content of 11 g/L.
- In 2014 used 434 lbs. PEG 200 in all SD-2 Unit #5 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 434 lbs x 0.009693 lbs. VOC/1 lb PEG 200 (=11 grams VOC/1 liter PEG200) = 4.20 lbs. VOC's discharged from SD-2 in 2014 = 0.0021 tpy. Utilizing the scrubber capture of 80% then VOC discharge from SD-2= 4.20 lbs. VOC's - (.80 x 4.20 lbs. VOC's) = 0.84 lbs. VOC's. VOC's per hour = 0.84 lbs./1360 hrs. = 0.00062 lbs./hr. VOC's. Tons per year calculation is, 0.84 lbs./2000 =0.00042 tpy.

Permit limits

- PM = 0.05 lbs./hr and 0.2 tpy
- VOC = 0.01 lbs./hr and 0.04 tpy
- 650 batches per year

CTS Electronic Components

2014 Air Emissions Inventory

CTS STACK - SPRAY DRYER STACK (SD3)
CITY STACK # 6

Background

- Nat Gas Fired Spray Dryer
- 353 batches in 2014 @ 5 hours per batch = 1765 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device is the cyclone followed by the baghouse and then the scrubber. All of the collected particulates are treated as waste. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test of SD-2 we have emission rates for PM and lead.

PM and Lead

- PM = 0.02 lbs./hr x 1765 hr =35.3 lbs. of PM/year = 0.018 tpy.
- Lead = 0.0024 lbs./hr x 1765 hr. = 4.24 lbs./year = 0.0021 tpy.

VOC & PEG-200

- Polyethylene glycol (PEG 200), is used as a binder in our PZT ceramic material and has a VOC content of 11 g/L.
- In 2014 used 1831 lbs. PEG 200 in all SD-3 Unit #6 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 1831 lbs x 0.009678 lbs. VOC/1 lb PEG 200 (=11 grams VOC/1 liter PEG200) = 17.72 lbs. VOC's discharged from SD-3 in 2014 = 0.0089 tpy. Utilizing the scrubber capture of 80% then VOC discharge from SD-3 = 17.72 lbs. VOC's - (.80 x 17.72 lbs. VOC's) = 3.54 lbs. VOC's. VOC's per hour = 3.54 lbs./1765 hrs. = 0.0020 lbs./hr. VOC's. Tons per year calculation is, 3.54 lbs./2000 =0.0018 tpy.
-

CO & NOx

- CO Test results on 8/99 - 0.5 lbs./hr
- 1765 hours of operation X 0.5 lbs./hr = 882.5 lbs. of CO or 0.441 tpy.
- NOx test results on 8/99 – 0.003 lbs./hr
- 1765 hours of operation X 0.003 lbs./hr = 5.30 lbs. of NOx or 0.0026 tpy

Permit limits

- PM = 0.05 lbs./hr and 0.2 tpy
- VOC = 0.01 lbs./hr and 0.04 tpy
- 650 batches per year

CTS Electronic Components

2014 Air Emissions Inventory

STACK N EMISSIONS – CITY # 7

Background

- Main solvent exhaust stack total hours of operation would be 8760 hours for the year 2014
- Hours of Operation: Backend filter production ran 12 hours per day for 7 days a week. Total hours of operation would be 4300 hours for the year 2014.

Solvent usage summary:

Total solvents purchased in 2014:	15,385 lbs.
Total VOC solvents purchased in 2014*:	12421 lbs.
Fugitive emissions (estimated) 5% of total solvents	769 lbs.
Hazardous Waste Flammable Liquid disposed in 2014	5417 lbs. Net

* As per 40 CFR51.100 acetone is listed as an exempt VOC since it has negligible photochemical reactivity. Thus CTS excluded 2014 acetone usage from its Unit 6 VOC emissions.

- VOC solvents emitted to stack N = 12,421 lbs.-769 Lbs = 11,652 lbs. = 5.826 tpy
  Note: this is a worst case calculation, it does not include solvent disposed as hazardous waste.
- Solvents per hour Stack N 2.79 lbs./hour ((12421 lbs. – 769 Lbs.) /4300 hours)
- Fugitive Emissions (City source # 12) 769 lbs./4300 hours = 0.179 lbs./hr. Tons per year = 769 lbs./2000 = 0.384 tpy.
- Solvent emission rate to Stack N which includes hazardous waste disposal of spent solvents in the mass balance calculation. ((12,421 lbs. – 769 lbs. – 5417 lbs.)/4300 hours = 1.45 lbs./hour. Tons per year = (12,421 lbs. – 769 lbs. – 5417 lbs.)/2000 = 3.118 tpy.
-

Material summary

See attached 2014 Solvent Table.

Permit Limits

VOC 8.0 lbs./hour and 28 tpy
Fugitive 0.4 lbs./hr and 1.8 tpy

CTS STACKS UF1, UF2 & UF3 – CITY 8, 9 & 10

Background

- Lead emissions are controlled by a series of filters Prefilters, bag filters and HEPA filters. Units total efficiency 99.9%.
- Estimated from PZT batch sheets that 7 pounds of material is lost per batch of PZT excluding what is collected by spray dry air pollution control system SD-2 and SD-3.

disposed of as hazardous waste or rinsed to our effluent wastewater treatment system. The 7.1 lbs. must be divided between dust collectors DC1, UF1, UF2 and UF3. Seven pounds lost to the dust collection system is very worst case situation.

- 625 batches per year at 2.5 hours per batch = 1562.5 hours of potential emissions
- Lead is 60% of the total dust.

UF1, Unit 8

PM

- 625 PZT batches X 7.1 lbs./ batch lost = 4437.5 lbs. On a worst case basis half of this material was released to this dust collection system. 4437.5 lbs./2 = 2218.8 lbs.
- 2219 lbs. X (1-99.9%) = 2.22 lbs./year or 0.00111 TPY PM.
- 2.22 lbs/year/1562.5 hours/year = 0.00142 lbs./hour.

Lead

- Lead is 60% of the total dust. Assumed to be part of PM 2.22 lbs./year of PM X (60%) = 1.32 lbs./year or 0.00067 TPY.
- 1.32 lbs./year of lead /1562 hours = 0.00085lbs./hour.

UF2, Unit 9

PM

- 625 PZT batches X 7.1 lbs./ batch lost = 4437.5 lbs. On a worst case basis half of this material was released to this dust collection system. 4437.5 lbs./2 = 2218.8 lbs.
- 2219 lbs. X (1-99.9%) = 2.22 lbs./year or 0.00111 TPY PM.
- 2.22 lbs/year/1562.5 hours/year = 0.00142 lbs./hour.

Lead

- Lead is 60% of the total dust. Assumed to be part of PM 2.22 lbs./year of PM X (60%) = 1.32 lbs./year or 0.00067 TPY.
- 1.32 lbs./year of lead /1562 hours = 0.00085lbs./hour.

UF3, Unit 10

PM

- 625 PZT batches X 7.1 lbs./ batch lost = 4437.5 lbs. On a worst case basis half of this material was released to this dust collection system. 4437.5 lbs./2 = 2218.8 lbs.
- 2219 lbs. X (1-99.9%) = 2.22 lbs./year or 0.00111 TPY PM.
- 2.22 lbs/year/1562.5 hours/year = 0.00142 lbs./hour.

Lead

- Lead is 60% of the total dust. Assumed to be part of PM 2.22 lbs./year of PM X (60%) = 1.32 lbs./year or 0.00067 TPY.

- 1.32 lbs./year of lead /1562 hours = 0.00085lbs./hour.
- 1.26 lbs./year of lead / 1478 hours = 0.00085lbs./hour.

Permit limits

- PM = 0.2 lbs./hr and 0.3 tpy per each Unit 8, 9, and 10
- Lead 0.0007 lbs./year and 0.001 tpy per each Unit 8, 9, and 10
- 1300 batches per year

ANNUAL NATURAL GAS USAGE & ASSOCIATED EMISSIONS (1) 2014
CITY NUMBERS 11A

- Phase 1 natural gas consumption in 2014 **10898 MMBTU**
- Utilizing AP-42, 5th Ed. Vol. 1 Chap. 1.4 External Combustion sources to calculate emissions associated with natural gas combustion.
- CTS Phase 1 boiler is rated a small watertube boiler <100 MMBTU/hr Heat Input, (actual 7.14 MMBTU/hr Heat Input) with uncontrolled emissions. Other natural gas consuming equipment at CTS are 2 small water heaters, RF spray dryer SD-1 and PZT Spray Dryer SD-3. Boiler hours 50% = 4380 hrs. Units 11-b through 11-f are under control of property manager, CNM and are not utilized by CTS operations.

Total Natural Gas Usage

NATURAL GAS	PM Total	SO_2	NOx	CO	VOC
10898 MMBTU	72 lbs.	5.7 lbs.	950 lbs.	797 lbs.	52 lbs.
Total Nat Gas	72 lbs.	5.7 lbs.	950 lbs.	797 lbs.	52 lbs.
Boiler etc. PPH	0.016	0.001	0.217	0.182	0.012
Boiler etc. TPY	0.036	0.003	0.474	0.399	0.026

2014 Air Emissions Inventory

CITY SOURCE NUMBERS 13, 14 & 15

- No reconfigurations or changes in control equipment.

CITY SOURCE NUMBER 16 EMERGENCY GENERATOR

- Operation under the control of the property manager CNM.

CITY SOURCE NUMBER 17 FIRE PUMP

- Operation under the control of the property manager CNM. CNM removed this unit from service.

2014 OPACITY READINGS

No violations of the 20% visible emissions limit occurred in 2014.

CTS Electronic Components

CTS 2014 Ceramic Binders and Dispersants

MATERIAL	Part No.	COMPOSITION	%	2014 purchased lbs.	2014 Usage lbs.
Polyvinyl Alcohol Binder	PN 1187057C01	Polyvinyl Alcohol Powder	100%	**441**	**55**
Polyvinyl Alcohol Liquid Binder 450 lbs/drum	S-25550R800063	Polyvinyl Alcohol Water	21% 79%	**4500**	**4801**
Polyethylene Glycol 200 Binder	PN 1187102D02	Polyethylene Glycol 200	100%	**2575**	**2519**
Polyethylene Glycol 400 Binder	PN S-25574	Polyethylene Glycol 400	100%	**515**	**254**
Tamol 963 35% Dispersant	PN 1187101D02	NH3 salt of Acrylic Polymers	35%	**2625**	**1459**
Lion AQ 3300 PAA Binder	PN S-17389	Dilute solution of polyacrylic acid	100%	**525**	**2003**
Mulsifan L61 Antifoam	PN S-22838	No listed hazardous chemicals	100%	**320**	**145**
Darvan C-N Dispersant	PN S-24505 CN	polymethacrylate water	25% 75%	**735**	**355**
		Total		**10215**	**9033**

CTS Electronic Components

CTS Electronic Components, Inc. 2014 Air Emissions Inventory
Solvents Purchased

MATERIAL & CTS PART NUMBER	2014 Purchases gal.	S.G.	COMPOSITION	Weight Percent	2014 Mixture (lbs)	2014 total
Methanol 1187125C01	440	0.81	Methanol	100%	2995	2995
Acetone 1183914J01	440	0.79	Acetone	100%	2921	2921
Xylene 1187137G01	10	0.87	Xylene	100%	73	73
Isopropyl Alcohol (IPA) 1100139A01	1265	0.78	Isopropyl Alcohol	100%	8292	8292
IPAL 11187129G01	110	0.78	IPA	60%	433	
			Toluene	32%	231	
			Acetone	6%	43	
			MIBK	2%	14	
			Total		721	721
Videojet Ink - Reservoir 1187220P01	1	Cs.	MEK	50%	8	
			Ink	35%	5	
9 quarts/case = 15 lbs.	15	lbs.	Total		13	8
Videojet Makeup Fluid 1187153M01	20	0.8	MEK	60%	180	
			Methanol	40%	120	
Cases 9 qts/cs 15 lbs./cs	300	Lbs.	Total		300	300
Silver Conductor Holecoat	20000	Grams	Silver			
Dupont 7307J	44.09	Pounds	Inert Material			
PN 1000113101			Xylene	30%	13	
			Ethyl Benzene	5%	2	
			Misc. solvents	1%	0	
solvent % by weight						
			Total Lbs		16	16
Silver Conductor HiVOC Spray	66000	Grams	Silver			
DuPont Autospray Silver 7342	145.51	Pounds	Inert Material			
1087195P01			Terpineol	14%	20	
			Misc. solvents	1%	1	
solvent % by weight						
			Total lbs		21.8	22
Silver - 7314 Print	8000	Grams	Silver			
Dupont 7314 Print	17.64	Pounds	Inert Material			
1087121M01			Xylene	10%	2	
			Pine Oil	10%	2	
			Misc. solvents	1%	0	
solvent % by weight						
			Total		4	4

MATERIAL & CTS PART NUMBER	2014 Purchases gal.	S.G.	COMPOSITION	Weight Percent	2014 Mixture (lbs)	2014 total
Silver HPZT	20000	Grams	Silver			
Ceronics Ag 918	44.09	Pounds	Inert Material			
Ag 918			Xylene	10%	4	
			Pine Oil	10%	4	
			Misc. solvents	1%	0	
solvent % by weight						
			Total		9	9
Silver HPZT	0	Grams	Silver			
Ceronics Ag 918-A	0.00	Pounds	Inert Material			
Ag 918-A			Xylene	10%	0	
			Pine Oil	10%	0	
			Misc. solvents	1%	0	
solvent % by weight						
			Total		0	0
Silver HPZT	54000	Grams	Silver			
Ceronics Ag 921-S	119.05	Pounds	Inert Material			
Ag 921-S			Xylene	10%	12	
			Pine Oil	10%	12	
			Misc. solvents	1%	1	
solvent % by weight						
					25	25
				2014 Total Solvents lbs.		**15385**
				20143 Total VOC's lbs.		**12421**

CTS Electronic Components, Inc. 2014 Air Emissions Inventory
Raw Materials Purchased

Description	PN	2014
weights in Lbs.		Purchase
Penox Company - Litharge (PbO)	1183583J01	44092
Hammond Lead Products - Litharge (PbO)	hammond1	92000
Brenntag Specialties Titanium Dioxide (TiO2)	1183584J01	19965
Daiichi Zirconium Oxide (ZrO2)	1183582J05	16535
Ishihara Titanium Dioxide (TiO2)	1183584J02	4410
Daiichi DK-2 Zirconium Oxide (ZrO2)	S-25871	25355
Sasol Aluminum Oxide (Al2O3)	S-10382	1654
TX-003 - Ferro - TICON T Barium Titanate (BaTiO3)	R100007	5290
TX-344 - Barium Titanite K8000	R100078	0
Z Tech Green Zirconium Oxide (ZrO2)	1183582J06	5720
TX-330 - Ferro Tamtron Barium Titanite (BaTiO3)	R100027	0
Ferro - Strontium Titanate (SrTiO3)	SRTIO3	2250
TX-002 - Ferro - TICON C Barium Titanate (BaTiO3)	R100008	0
Treibecher PZT Lanthanum Oxide (La2O3)	1183585J02	1654
TX-356 - Dimat C150 Barium Titanite	R100111	1543
TX-352 - MRA Neodymium Barium Titanate	R100105	0
Keeling Walker RF Tin Oxide (SnO2)	1187181D01	1800
TX-0035 - Ferro - 219-6A Barium Titanate (BaTiO3)	R100040	4394
Solvay Barium Carbonate (BaCO3)	1187208P01	772
TX-022 - Ferro - 117 Calcium Zirconate (CaZrO3)	R100018	1354
HC Stark - Niobium Pentoxide (Nb2O5)	1187238C01	772
TX-028 - Ferro - 317 Calcium Stannate (CaSnO3)	R100043	0
Keeling and Walker PZT Tin Oxide (Sn2O3) (super)	1183604J01	200
TX-001 - Ferro - Titanium Dioxide (TiO2)	R100006	0
MCP Bismuth Oxide (Bi2O3)	1187133D01	110
TX-027 - Ferro - 220-2, Bismuth Titanate (Bi2O3-TiO2)	R100080	503
TX-049 - Materion - Zinc Oxide (ZnO)	R100033	55
TX-055 - Blue Line - Niobium Pentoxide (Nb2O5)	R100022	0
Novamet Nickel Oxide (NiO)	1100112001	0
Ferro - Barium Zirconate (BaZrO3)	S-10363	50
TX-061 - Blue Line -Neodymium Oxide (Nd2O3)	R100021	132
Manganese Oxide (Mn2O3)	S-10383	9
Brenntag Mg Stearate	1187058C01	0
Lead Chromate (S-16483)	PbCrO4	0
CPC Barium Carbonate (BaCO3)	1187054C01	0
Rockwood Iron Oxide (S-16484)	Fe2O3	0
Brenntag / Rhodia Samarium Oxide (Sm2O3)	1187535P01	330
Brenntag / Rhodia Neodymiun Oxide (Nd2O3).	1187132D02	265
Horsehead Corp Zinc Oxide (ZnO) - #1187182D01	1187182D01	0
TX-063 - Alfa Aesar - Cerium Oxide (CeO2)	R100028	0
TX-66 - Noah Technologies - Manganese Oxide (MnO2)	R100077	0

CTS Electronic Components

CTS 2014 PZT BATCHES

Composition	3195	3199	3203	3221	3222	3241	3257	K1000	K1100	K1300	K1350	K1450	PZ	Sum
Batches Started	70	3	72	8	27	79	7	7	65	264	3	14	6	625
Batches Qualified	69	3	68	8	25	79	7	7	62	260	3	14	6	611
Processed Material kg	10500	450	10800	1200	4050	11850	1050	1050	9750	39600	450	2100	900	93750
Fabbed Material kg	9400	265	9829	1104	3630	10687	861	933	8594	34890	386	1796	820	83194

CTS Electronic Components

2014 CTS RF and EMC Batches

Composition	C03	C11	C14	C12	EMC	Total
No. Spray Dry batches	3	7	16	18	73	117
Calcine wt. kg	612	371	1641	7219	8343	18186
Cyclone wt. added kg	76	32	84	345	279	816
Total batch weight	688	403	1725	7525	8622	18963
Cyclone wt kg	615	308	1484	7189	6884	16480
Spray dry wt. kg	81	52	244	347	1491	2215
Loss wt. kg	-8	43	-3	-11	247.0	268

CTS Gas Usage 2014

AP-42 Calculations

MMBTU	10898
Therms	108982

	lbs./MMBTU	2014 Lbs.
NOx	0.0980	948.8
CO	0.0824	797.0
PM total	0.0075	72.1
SO2	0.0006	5.7
VOC	0.0054	52.2
Pb	4.90E-07	0.0

In the YELLOW CELLS ONLY: Enter the UNIT ID and its total hours of operation. If there is only one unit, please leave the cell blank.
In the GREEN CELLS ONLY enter the PERMITTED emission factor for each pollutant, each unit. There is space to enter additional po

UNIT ID	Pollutant >> Hours of Operation	NOx Emission Factor (from permit) lbs/hr	NOx Tons per Year (calculation)	CO Emission Factor (from permit) lbs/hr	CO Tons per Year (calculation)	SOx Emission Factor (from permit) lbs/hr	SOx Tons per Year (calculation)	VOC Emission Factor (from permit) lbs/hr	VOC Tons per Year (calculation)
#1, DC1	8760		0		0		0		0
#2, DC2	8760		0		0		0		0
#4 SD1	585	0.003	0.0008775	0.5	0.14625		0	0.0008	0.000234
#5 SD2	1360		0		0		0	0.00062	0.0004216
#6 SD3	1765	0.003	0.0026475	0.5	0.44125		0	0.002	0.001765
#7 Stack N	8760		0		0		0	1.45	3.12
#8 UF1	8760		0		0		0		0
#9 UF2	8760		0		0		0		0
#10 UF3	8760		0		0		0		0
#11A Boiler Ph 1	4380	0.217	0.47523	0.182	0.39858	0.001	0.00219	0.012	0.02628
#12 Fugitive	8760		0		0		0	0.179	0.384
	TOTAL TPY >>	NOx tpy	0.478755	CO tpy	0.98608	SOx tpy	0.00219	VOC tpy	3.5327006

In the YELLOW (

In the GREEN Cbllutants (HAPs) to the right. >>>

UNIT ID	TSP Emission Factor (from permit) lbs/hr	TSP Tons per Year (calculation)	PM10 Emission Factor (from permit) lbs/hr	PM10 Tons per Year (calculation)	OTHER HAP Emission Factor (from permit) lbs/hr	OTHER HAP Tons per Year (calculation)	OTHER HAP Emission Factor (from permit) lbs/hr	OTHER HAP Tons per Year (calculation)
#1, DC1	0.11	0.0859	0	0	0.0033	0.0026	0	0
#2, DC2	0.09	0.026	0	0		0	0	0
#4 SD1	0.06	0.018	0	0		0	0	0
#5 SD2	0.02	0.0136	0	0	0.0024	0.001632	0	0
#6 SD3	0.02	0.01765	0	0	0.0024	0.002118	0	0
#7 Stack N		0	0	0		0	0	0
#8 UF1	0.0014	0.0011	0	0	0.0009	0.0007	0	0
#9 UF2	0.0014	0.0011	0	0	0.0009	0.0007	0	0
#10 UF3	0.0014	0.0011	0	0	0.0009	0.0007	0	0
#11A Boiler Ph 1	0.016	0.036	0	0		0	0	0
#12 Fugitive		0	0	0		0	0	0
	TSP tpy	0.20045	PM10 tpy	0	OTHER HAP tpy	0.00845	OTHER HAP tpy	0

CTS Electronic Components

2015 Air Emissions Inventory

Index

- 2015 Emissions Inventory Summary Table
- List and number of stacks
- Emissions calculations for sources 1- 17
- Chemical usage ÷

CTS ELECTRONIC COMPONENTS

CTS 2015 Annual Emission Report Summary

Date: 3/9/16
File: fees.xls
From: J. Wakefield
Page: 1 of 1

Unit	CTS	NOx		SO2		CO		VOC		PM		Lead	
No.	Descrip.	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY
1	DC1									0.11	0.0846	0.0033	0.0025
2	DC2									0.09	0.022		
4	SD1	0.003	0.0007			0.5	0.12	0.0008	0.0002	0.06	0.014		
5	SD2							0.0009	0.0006	0.02	0.0132	0.0024	0.0016
6	SD3	0.003	0.0026			0.5	0.441	0.002	0.0017	0.02	0.018	0.0024	0.0021
7	N							1.14	2.46				
8	UF1									0.0001	0.0003	0.0002	0.0007
9	UF2									0.0001	0.0003	0.0002	0.0007
10	UF3									0.0001	0.0003	0.0002	0.0007
11a	All N. Gas	0.217	0.474	0.001	0.003	0.182	0.399	0.012	0.026	0.016	0.036		
12	FUG							0.125	0.269				
2015	SUM	0.2230	0.4773	0.0010	0.003	1.1820	0.960	1.2807	2.7575	0.3163	0.1887	0.0087	0.0083

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

List of Stacks

CTS ID	CITY #	DESCRIPTION & LOCATION OF STACK	CONTROL EQUIPMENT
		PHASE 1	
IL1	13	Midsaw exhaust	Pre-filters, Wet Process
UF10	14	Centerless Grinding	Wet process
		PZT FOUNDRY PHASE I	
UF1	8	PZT Kiln exhaust	Filter series: Pre-filters, bag filters, HEPA filters.
UF2	9	PZT Lead Handling Room and Batching Room	Filter series: Pre-filters, bag filters, HEPA filters.
UF3	10	PZT Lead Batching Room	Filter series: Pre-filters, bag filters, HEPA filters.
DC1	1	PZT Powder Packing	Dust collector with efficiency cartridge filters (95% efficient).
SD2	5	PZT spray dryer, electric	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
SD3	6	PZT spray dryer, Nat Gas	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
		RF FOUNDRY PHASE I	
SD1	4	Spray dryer, gas fired (BT/Neo materials)	Cyclones, bag house (95% efficient) and mist eliminator (80% efficient).
DC2	2	Batching exhaust – Dust Collector	Dust collector with efficiency cartridge filters (95% efficient).

ENTIRE FACILITY Common Area Equipment for Phases 1, 2, 3 and 4. CTS operates Phase 1 and the warehouse portion of Phase 2.

N	7	Main NMHC stack, Phases I process equipment. Phase 3 and 4 no longer part of CTS operations	No VOC Control equipment on stack. Pre-filters or in-house dust collectors on all dust generating equipment exhausting inside the building.
C	11a	Phase 1 Facility boiler - All natural gas	No control equipment maintained by CNM.
	11b-c	Phase 2 Facility boiler - All natural gas	No control equipment maintained by CNM. Shared heating CNM – CTS.
	11 d-f	Phase 3, 4 boilers CNM operations	CNM operations heating boilers
	16	Emergency Generator Phase 2, Controlled by Property owner	Not CTS equipment or CTS operations, No control equipment
	17	Fire Pump Engine Controlled by Property owner	Removed from Service

CTS is expanding our warehouse operations in the Phase 2 CNM warehouse area.

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

STACK DC1 - BAG HOUSE FOR PZT POWDER PACKING –CITY # 1

Background

- Baghouse dust collector system efficiency = 99.95% efficient at 0.5 μm.
- PZT powder is 66.06% lead oxide 615 batches in 2015.
- Hours of operation = 615 batches × 2.5 hours per batch = 1538 hours
- Based on 1999 Stack test on DC-1 for PM and lead the following emissions are calculated.

PM and Lead Emissions:

- PM = 0.11 lbs./hr × 1538 hr = 169 lbs. of PM/year = 0.0846 tpy.
- Lead oxide = 0.0033 lbs./hr × 1562 hr. = 5.1 lbs./year = 0.0025 tpy.

Permit Limits

- 1200 Batches per year
- 0.3 lbs./hr and 0.4 tpy PM
- Lead 0.01 lbs./hour and 0.02 tpy

CTS STACK- DUST COLLECTOR FOR EAST SIDE FOUNDRY DC2 - CITY # 2

Background

- The stated efficiency of the cartridges is 99% efficient.
- 97 batches were produced in the foundry in 2015. The dust collection system ran continuously. Five hours per batch processing time so for 97 batches total hours equals 485 hours.
- Based on 1999 DC-2 Stack test for PM the following emissions are calculated.

PM

- PM = 0.09 lbs./hr × 485 hr =43.6 lbs. of PM/year = 0.022 tpy.

Permit Limits

- 1300 Batches per year
- 0.8 lbs./hr PM
- 1.2 tpy PM

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

CTS STACK –SPRAY DRYER 1 (SD1)
CITY STACK # 4

Background

- Gas Spray Dryer
- 97 batches in 2015 @ 5 hours per batch = 485 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device, the cyclone collects the majority of the powder that bypasses the spray dryer. This is returned to the process as product. Baghouse dust is collected as waste. Final capture device is the scrubber. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test we have emission rates for PM, CO and NOx.

PM

- PM = 0.06 lbs./hr × 485 hr = 29.1 lbs. of PM/year = 0.014 tpy.

VOC

- Polyethylene glycol (PEG 400), is used as a binder in our ceramic material and has a VOC content of 11 g/L.
- In 2015 used 189 lbs. PEG 400 in SD-1 Unit #4 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 189 lbs × 0.009693 lbs. VOC/1 lb PEG 400 (=11 grams VOC/1 liter PEG 400) = 1.83 lbs. VOC's discharged from SD-1. Utilizing the scrubber capture of 80% then VOC discharge from SD-1 = 1.83 lbs. VOC's - (.80 × 1.83 lbs. VOC's) = 0.37 lbs. VOC's lbs. per hour from SD-1 = 0.37 lbs. ÷ 485 hr = 0.00076 lbs./hr. VOC's. Tons per year calculation is, 0.37 lbs./2000 =0.00018 tpy.

CO & NOx

- CO Test results on 8/99 - 0.5 lbs./hr
- 485 hours of operation × 0.5 lbs./hr =242 lbs. of CO or 0.12 tpy
- NO_x test results on 8/99 – 0.003 lbs./hr
- 485 hours of operation × 0.003 lbs./hr = 1.46 lbs. of NO_x or 0.00073 tpy

Permit Limits

- PM = 0.1 lbs./hr and 0.4 tpy
- VOC = 0.02 lbs./hr and 0.08 tpy
- CO = 1.0 lbs./hr and 1.0 tpy
- NOx = 0.01 lbs./hr and 0.03 tpy
- 1300 Batches per year

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

CTS STACK SPRAY DRYER 2 (SD2)
CITYSTACK # 5

Background

- Electric Spray Dryer
- 265 batches in 2015 @ 5 hours per batch = 1325 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device is the cyclone followed by the baghouse and then the scrubber. All of the collected particulates are treated as waste. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test we have emission rates for PM and lead.

PM and Lead Oxide

- PM = 0.02 lbs./hr × 1325 hr =26.5 lbs. of PM/year = 0.0132 tpy.
- Lead oxide = 0.0024 lbs./hr × 1325 hr. = 3.18 lbs./year = 0.0016 tpy.

VOC & PEG-200

- Polyethylene glycol (PEG 200), is used as a binder in our PZT ceramic material and has a VOC content of 11 g/L.
- In 2015 used 603 lbs. PEG 200 in all SD-2 Unit #5 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 603 lbs. × 0.009693 lbs. VOC/1 lb PEG 200 (=11 grams VOC/1 liter PEG200) = 5.84 lbs. VOC's discharged from SD-2 in 2015 = 0.0029 tpy. Utilizing the scrubber capture of 80% then VOC discharge from SD-2= 5.84 lbs. VOC's - (.80 × 5.84 lbs. VOC's) = 1.17 lbs. VOC's. VOC's per hour = 1.17 lbs.÷ 1325 hrs. = 0.00088 lbs./hr. VOC's. Tons per year calculation is, 1.17 lbs. ÷ 2000 =0.00058 tpy.

Permit limits

- PM = 0.05 lbs./hr and 0.2 tpy
- VOC = 0.01 lbs./hr and 0.04 tpy
- 650 batches per year

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

CTS STACK - SPRAY DRYER STACK (SD3)
CITY STACK # 6

Background

- Nat Gas Fired Spray Dryer
- 350 batches in 2015 @ 5 hours per batch = 1750 hours of operation/year.
- Air pollution control devices for the spray dryer include a cyclone, baghouse and scrubber. These are in series in the spray dryer exhaust. The first air pollution control device is the cyclone followed by the baghouse and then the scrubber. All of the collected particulates are treated as waste. The scrubber solution and equipment wash water is sent to effluent for wastewater treatment. Pollution control efficiency is 98% plus.
- Based on the 1999 and 2004 stack test of SD-2 we have emission rates for PM and lead.

PM and LeadOxide

- PM = 0.02 lbs./hr × 1750 hr =35.0 lbs. of PM/year = 0.018 tpy.
- Lead oxide = 0.0024 lbs./hr × 1750 hr. = 4.20 lbs./year = 0.0021 tpy.

VOC & PEG-200

- Polyethylene glycol (PEG 200), is used as a binder in our PZT ceramic material and has a VOC content of 11 g/L.
- In 2015 used 1786 lbs. PEG 200 in all SD-3 Unit #6 batches.
- Associated VOC discharge assuming worst case, (no pollution control) = 1786 lbs × 0.009678 lbs. VOC/1 lb PEG 200 (=11 grams VOC/1 liter PEG200) = 17.28 lbs. VOC's discharged from SD-3 in 2015 = 0.0086 tpy. Utilizing the scrubber capture of 80% then VOC discharge from SD-3 = 17.28 lbs. VOC's - (.80 × 17.28 lbs. VOC's) = 3.46 lbs. VOC's. VOC's per hour = 3.46 lbs. ÷ 1750 hrs. = 0.0020 lbs./hr. VOC's. Tons per year calculation is, 3.46 lbs. ÷ 2000 =0.0017 tpy.

CO & NOx

- CO Test results on 8/99 - 0.5 lbs./hr
- 1750 hours of operation × 0.5 lbs./hr = 875 lbs. of CO or 0.44 tpy.
- NOx test results on 8/99 – 0.003 lbs./hr
- 1750 hours of operation × 0.003 lbs./hr = 5.25 lbs. of NOx or 0.0026 tpy

Permit limits

- PM = 0.05 lbs./hr and 0.2 tpy
- VOC = 0.01 lbs./hr and 0.04 tpy
- 650 batches per year

CTS ELECTRONIC COMPONENTS

2015 Air Emissions Inventory

STACK N EMISSIONS – CITY # 7

Background

- Main solvent exhaust stack total hours of operation would be 8760 hours for the year 2015
- Hours of Operation: Backend filter production ran 12 hours per day for 7 days a week. Total hours of operation would be 4300 hours for the year 2015.

Solvent usage summary:

Total solvents purchased in 2015:	10,751 lbs.
Total VOC solvents purchased in 2015*:	8,882 lbs.
Fugitive emissions (estimated) 5% of total solvents	538 lbs.
HW Solvent disposal in 2015 Net wt. (minus drum)	3416 lbs. Net lbs.

* As per 40 CFR51.100 acetone is listed as an exempt VOC since it has negligible photochemical reactivity. Thus CTS excluded 2015 acetone usage from its Unit 6 VOC emissions.

- VOC solvents emitted to stack N = 8,882 lbs.-538 Lbs.-3416 Lbs.=4,928 lbs. = 2.464 tpy
- Solvents per hour Stack N 1.14 lbs./hour ((4928 lbs. ÷ 4300 hours)
- Fugitive Emissions (City source # 12) 538 lbs./4300 hours = 0.125 lbs./hr. Tons per year = 538 lbs. ÷ 2000 = 0.269 tpy.

Material summary

See attached 2015 Solvent Table.

Permit Limits

VOC 8.0 lbs./hour and 28 tpy
Fugitive 0.4 lbs./hr and 1.8 tpy

CTS STACKS UF1, UF2 & UF3 – CITY 8, 9 & 10

Background

- Lead oxide emissions are controlled by a series of filters Prefilters, bag filters and HEPA filters. Units total efficiency 99.9%.
- Data from the attached Table "CTS 2015 PZT Batches" generates the following mass balance calculations;

  96,585 Kg. PZT initial weight – 5142 Kg. collected PZT scrap material – 90,502 Kg. of PZT batch yield = 941 Kg. = 2075 lbs. of lost PZT powder. 941 Kg ÷ 615 batches = 1.53 Kg. of lost PZT per batch = 1.53 Kg. × 2.2046 lbs./Kg. = 3.37 lbs. of lost PZT per batch.

- From previous calculations approximately 3.37 lbs. is lost per batch of PZT or 2075 lbs. of PZT in 2015. The bulk of this material is collected and disposed of as hazardous waste or is rinsed to PZT sludge collection tanks and/or rinsed to our wastewater treatment system. Using worst case 3.37 lbs. per batch, (2075 lbs. in 2015) this quantity is divided between dust collectors DC1, UF1, UF2 and UF3.
- 615 batches per year at 7.5 hours per batch, (2.5 hours + 5 hours) = 4612.5 hours of potential emissions
- Average weight percent lead oxide in PZT batches is 66.06%

UF1, Unit 8

PM

- 615 PZT batches in 2015, 3.37 lbs./ batch lost = 2075 lbs./year lost. Worst case basis = all 2075 lbs. ÷ 4 dust collectors = 519 lbs.
- 519 lbs. - (519 lbs. × 0.999) = 0.519 lbs./year or 0.00026 TPY PM.
- 0.519 lbs./year ÷ 4612.5 hours/year = 0.00011 lbs./hour PM.

Lead Oxide

- Lead oxide is 66.06% of the total dust. Assumed to be part of PM 0.519 lbs./year of PM × 0.6606) = 0.342 lbs./year or 0.00067 TPY lead oxide.
- 1.32 lbs./year of lead oxide ÷ 1562 hours = 0.00017lbs./hour.

UF2, Unit 9

PM

- 615 PZT batches in 2015, 3.37 lbs./ batch lost = 2075 lbs./year lost. Worst case basis = all 2075 lbs. ÷ 4 dust collectors = 519 lbs.
- 519 lbs. - (519 lbs. × 0.999) = 0.519 lbs./year or 0.00026 TPY PM.
- 0.519 lbs./year ÷ 4612.5 hours/year = 0.00011 lbs./hour PM.

Lead Oxide

- Lead oxide is 66.06% of the total dust. Assumed to be part of PM 0.519 lbs./year of PM × 0.6606) = 0.342 lbs./year or 0.00067 TPY lead oxide.
- 1.32 lbs./year of lead oxide ÷ 1562 hours = 0.00017lbs./hour.

UF3, Unit 10

PM

- 615 PZT batches in 2015, 3.37 lbs./ batch lost = 2075 lbs./year lost. Worst case basis = all 2075 lbs. ÷ 4 dust collectors = 519 lbs.
- 519 lbs. - (519 lbs. × 0.999) = 0.519 lbs./year or 0.00026 TPY PM.
- 0.519 lbs./year ÷ 4612.5 hours/year = 0.00011 lbs./hour PM.

Lead oxide

- Lead oxide is 66.06% of the total dust. Assumed to be part of PM 0.519 lbs./year of PM × 0.6606) = 0.342 lbs./year or 0.00067 TPY lead oxide.
- 1.32 lbs./year of lead oxide ÷ 1562 hours = 0.00017lbs./hour.

ANNUAL NATURAL GAS USAGE & ASSOCIATED EMISSIONS (1) 2015 CITY NUMBERS 11A

- Phase 1 and a portion of Phase 2 natural gas consumption in 2015 = **10898 MMBTU**
- Utilizing AP-42, 5th Ed. Vol. 1 Chap. 1.4 External Combustion sources to calculate emissions associated with natural gas combustion.
- CTS Phase 1 boiler is rated a small watertube boiler <100 MMBTU/hr Heat Input, (actual 7.14 MMBTU/hr Heat Input) with uncontrolled emissions. Same for the 2 boilers in CNM's Phase 2 of which a portion heats CTS operations. Other natural gas consuming equipment at CTS are 2 commercial 100 gal. high efficiency water heaters rated at 199,000 BTUH, RF spray dryer SD-1 and PZT Spray Dryer SD-3. Boiler hours 50% = 4380 hrs. Units 11-b and 11-c heat shared space for both CNM and CTS.

Total Natural Gas Usage

NATURAL GAS	PM Total	$S0_2$	NOx	CO	VOC
10898 MMBTU	70.3 lbs.	5.6 lbs.	925.3 lbs.	777.3 lbs.	50.9 lbs.
Total Nat Gas	70.3 lbs.	5.6 lbs.	925.3 lbs.	777.3 lbs.	50.9 lbs.
Boiler etc. PPH	0.016	0.001	0.217	0.182	0.012
Boiler etc. TPY	0.036	0.003	0.474	0.399	0.026

CTS Electronic Components

2015 Air Emissions Inventory

CITY SOURCE NUMBERS 13, 14 & 15

- No reconfigurations or changes in control equipment.

CITY SOURCE NUMBER 16 EMERGENCY GENERATOR

- Operation under the control of the property manager CNM. Currently non-operational.

CITY SOURCE NUMBER 17 FIRE PUMP

- Operation under the control of the property manager CNM. CNM removed this unit from service.

2015 OPACITY READINGS

- No violations of the 20% visible emissions limit occurred in 2015.

CTS Electronic Components

CTS 2015 PZT BATCHES

Type	SPZT	SPZT	SPZT	SPZT	SPZT	SPZT	SPZT	HPZT	HPZT	HPZT	HPZT	HPZT	PZ	
Material	3195	3199	3203	3221	3222	3241	3257	K1000	K1100	K1300	K1350	K1450	PZ	Sum
Count														
No.Batches	88	6	47	13	46	63	2	5	22	293	14	7	9	615
Reject	0	0	0	0	0	0	0	0	0	3	0	0	0	3
Kg.														
Initial weight	13,055	888	6,975	1,927	6,803	9,392	299	805	3,417	48,242	2,444	994	1,345	96,585
Scrap Collected	633	53	350	98	358	526	26	46	203	2,579	133	72	65	5,142
Fabricated	12,038	799	6,380	1,796	6,358	8,577	257	723	3,089	46,036	2,182	1,012	1,255	90,502

CTS Electronic Components

2015 CTS RF and EMC Batches

Composition	C03	C11	C12	C14	EMC	Total
Batch Count	6	4	11	17	59	97
Start Weight Kg.	1,177	855	1,722	6,199	4,066	14,020
Cyclone Added Kg.	150	113	322	359	250	1,194
Total Start Kg.	1,327	968	2,040	6,558	4,316	15,210
Spray Dry Kg.	1,168	786	1,751	6,247	3,481	13,433
Cyclone Collected Kg.	167	117	323	362	689	1,658
Loss/Gain wt. Kg	8	-65	30	51	-146	-123

CTS Electronic Components

CTS 2015 Ceramic Binders and Dispersants

MATERIAL	Part No.	COMPOSITION	%	2015 purchased lbs.	2015 Usage lbs.
Polyvinyl Alcohol Binder	PN 1187057C01	Polyvinyl Alcohol Powder	100%	**0**	**0**
Polyvinyl Alcohol Liquid Binder 450 lbs/drum	S-25550	Polyvinyl Alcohol Water	21% 79%	**8550**	**4106**
Polyethylene Glycol 200 Binder	PN 1187102D02	Polyethylene Glycol 200	100%	**2575**	**2388**
Polyethylene Glycol 400 Binder	PN S-25574	Polyethylene Glycol 400	100%	**0**	**189**
Tamol 963 35% Dispersant	PN 1187101D02	NH3 salt of Acrylic Polymers	35%	**2625**	**1447**
Lion AQ 3300 PAA Binder	PN S-17389	Dilute solution of polyacrylic acid	100%	**1350**	**1666**
Mulsifan L61 Antifoam	PN S-22838	No listed hazardous chemicals	100%	**480**	**100**
Nalco 71D5 Plus Antifoam 5 gal.	PN71d5	Petroleum distillate SRM Hydrotreated light distillate	30-60% 10-30%	**33**	**34**
Darvan C-N Dispersant	PN S-24505 CN	ammonia polymethacrylate water	25% 75%	**420**	**220**
Darvan 821-A Dispersant	PN R100046	ammonia polyacrylate water	40% 60%	**0**	**66**
Zusoplast 126 Emulsifier	PN S-22837	Poly(ethylene glycol) monoleate, Fatty acids, 2 Butoxyethanol	Manu. Trade Secret	**0**	**39**
		Total		**13750**	**8130**

CTS Electronic Components

CTS Electronic Components, Inc. 2015 Air Emissions Inventory
Solvents Purchased

MATERIAL & CTS PART NUMBER	2015 Purchases gal.	S.G.	COMPOSITION	Weight Percent	2015 Purchase (lbs)	2015 total
Methanol	220	0.81	Methanol	100%	1497	1497
1187125C01						
Acetone	275	0.79	Acetone	100%	1826	1826
1183914J01						
Xylene	0	0.87	Xylene	100%	0	0
1187137G01						
Isopropyl Alcohol (IPA)	935	0.78	Isopropyl Alcohol	100%	6129	6129
1100139A01						
IPAL	110	0.78	IPA	60%	433	
11187129G01			Toluene	32%	231	
			Acetone	6%	43	
			MIBK	2%	14	
			Total Lbs		721	721
Videojet Ink - Reservoir	1	Cs.	MEK	50%	8	
1187220P01			Ink	35%	5	
9 quarts/case = 15 lbs.	15	lbs.	Total Lbs		13	8
Videojet Makeup Fluid	30	0.8	MEK	60%	270	
1187153M01			Methanol	40%	180	
Cases 9 qts/cs 15 lbs./cs	450	Lbs.	Total Lbs		450	450
Silver Conductor Holecoat	36,000	Grams	Silver	60%		
Dupont 7307J	79.37	Pounds	Glass	5%		
PN 1000113101			Xylene	30%	24	
			Ethyl Benzene	5%	4	
			Misc. solvents	1%	1	
solvent % by weight			Total Lbs		29	29
Silver Conductor HiVOC Spray	84,000	Grams	Silver	60%		
DuPont Autospray Silver 7342	185.19	Pounds	Glass	5%		
1087195P01			Terpineol	14%	26	
			Misc. solvents	1%	2	
solvent % by weight			Total lbs		27.8	28
Silver - 7314 Print	10,000	Grams	Silver	60%		
Dupont 7314 Print	22.05	Pounds	Glass	5%		
1087121M01			Xylene	10%	2	
			Pine Oil	10%	2	
			Misc. solvents	1%	0	
solvent % by weight			Total Lbs		5	5

MATERIAL & CTS PART NUMBER	2015 Purchases gal.	S.G.	COMPOSITION	Weight Percent	2015 Purchase (lbs)	2015 total
Silver Conductor Print	35,500	Grams	Silver	60%		
Dupont 7095	78.26	Pounds	Glass	5%		
D11431579			Terpineol	30%	23	
PN S-26341						
solvent % by weight			Total Lbs		23	23
Silver Conductor Autospray	82,000	Grams	Silver	75%		
Dupont 7096	180.78	Pounds	Glass	5%		
D15312369			Terpineol	10%	18	
PN S-26593			Dibutyldiglycol	10%	18	
solvent % by weight			Total Lbs		36	36
					2015 Total Solvents lbs.	**10751**
					2015 Total VOC's lbs.	**8882**

CTS Electronic Components, Inc. 2015 Air Emissions Inventory
Raw Materials Purchased

Description	PN	2015
All weights in Lbs.		Purchase
		Lbs.
Hammond Lead Products - Litharge (PbO)	hammond1	96290
Penox Company - Litharge (PbO)	1183583J01	55115
Daiichi DK-2 Zirconium Oxide (ZrO2)	S-25871	26455
Brenntag Specialties Titanium Dioxide (TiO2)	1183584J01	18480
Daiichi Zirconium Oxide (ZrO2)	1183582J05	15432
Ishihara Titanium Dioxide (TiO2)	1183584J02	7716
Z Tech Green Zirconium Oxide (ZrO2)	1183582J06	5060
Treibecher PZT Lanthanum Oxide (La2O3)	1183585J02	2205
Strontium Titanate TICON55	TICON55	1980
Sasol Aluminum Oxide (Al2O3)	S-10382	1653
TX-330 - Ferro Tamtron Barium Titanite (BaTiO3)	R100027	1206
Keeling Walker RF Tin Oxide (SnO2)	1187181D01	1000
Ferro - Strontium Titanate (SrTiO3)	SRTIO3	990
Brenntag / Rhodia Samarium Oxide (Sm2O3)	1187535P01	882
TX-003 - Ferro - TICON T Barium Titanate (BaTiO3)	R100007	661
TX-010 - Calcium Titanate Code 217	R100045	551
TX-022 - Ferro - 117 Calcium Zirconate (CaZrO3)	R100018	452
HC Stark - Niobium Pentoxide (Nb2O5)	1187238C01	330
Keeling and Walker PZT Tin Oxide (Sn2O3) (super)	1183604J01	300
TX-027 - Ferro - 220-2, Bismuth Titanate (Bi2O3-TiO2)	R100080	251
MCP Bismuth Oxide (Bi2O3)	1187133D01	221
Titanium Dioxide Kerr-McGee	1187099C01	165
Brenntag / Rhodia Neodymiun Oxide (Nd2O3)	1187132D02	132
Manganese Oxide (Mn2O3)	S-10383	18
TX-0035 - Ferro - 219-6A Barium Titanate (BaTiO3)	R100040	0
TX-356 - Dimat C150 Barium Titanite	R100111	0
Solvay Barium Carbonate (BaCO3)	1187208P01	0
TX-061 - Blue Line -Neodymium Oxide (Nd2O3)	R100021	0
TX-049 - Materion - Zinc Oxide (ZnO)	R100033	0
Ferro - Barium Zirconate (BaZrO3)	S-10363	0
Brenntag Mg Stearate	1187058C01	0
CPC Barium Carbonate (BaCO3)	1187054C01	0
Horsehead Corp Zinc Oxide (ZnO) - #1187182D01	1187182D01	0
Lead Chromate (S-16483)	PbCrO4	0
Novamet Nickel Oxide (NiO)	1100112001	0
Rockwood Iron Oxide (S-16484)	Fe2O3	0
TX-001 - Ferro - Titanium Dioxide (TiO2)	R100006	0

Description	PN	2015
All weights in Lbs.		Purchase
		Lbs.
TX-002 - Ferro - TICON C Barium Titanate (BaTiO3)	R100008	0
TX-028 - Ferro - 317 Calcium Stannate (CaSnO3)	R100043	0
TX-055 - Blue Line - Niobium Pentoxide (Nb2O5)	R100022	0
TX-063 - Alfa Aesar - Cerium Oxide (CeO2)	R100028	0
TX-344 - Barium Titanite K8000	R100078	0
TX-352 - MRA Neodymium Barium Titanate	R100105	0
TX-66 - Noah Technologies - Manganese Oxide (MnO2)	R100077	0
Zirconia E - F Extra	1183582J07	0
Zirconium Dioxide	ZRO2TIAN	0
TX-012 - Lead Titanite Ticon 95	R100020	0
TX-005 - Barium Titanate (BaTiO3) CN Grade	R100001	0
TX-004 - Barium Titanate (BaTiO3) COF-40	R100010	0
TX-014 - Barium Zirconate Code 119	R100064	0
TX-011 - Magnesium Titanite Ticon 75	R100014	0
TX-021 - Titanium Dioxide 203-1A (TiO2)	R100019	0
TX-006 - Strontium Titanate Code 218	R100031	0
TX-033 - Strontium Titanate	R100047	0
TX-021 - Titanium Dioxide 203-1A (TiO2)	R100019	0

CTS Gas Usage 2015

Delivery Month	Account Name	CTS Total MMBTU
Jan-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	1,948.2
Feb-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	1,453.0
Mar-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	1,007.8
Apr-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	496.0
May-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	313.5
Jun-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	90.0
Jul-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	73.1
Aug-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	83.0
Sep-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	149.0
Oct-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	766.4
Nov-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	1,443.3
Dec-15	CTS-CNM ALAMEDA BUSINESS CENTER #2 + #3	1,615.0

SUM 9,438.3

AP-42 Calculations

MMBTU	9438
Therms	94383

	lbs./MMBTU	2015 Lbs.
NOx	0.0980	925.3
CO	0.0824	777.3
PM total	0.0075	70.3
SO2	0.0006	5.6
VOC	0.0054	50.9
Pb	4.90E-07	0.0

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

Supporting Information
DC-4 Filter System

DURAPLEAT® GOLD CONE®

CARTRIDGE FOR FARR GOLD SERIES® COLLECTORS

camfil
AIR POLLUTION CONTROL

MEDIA OPTIONS

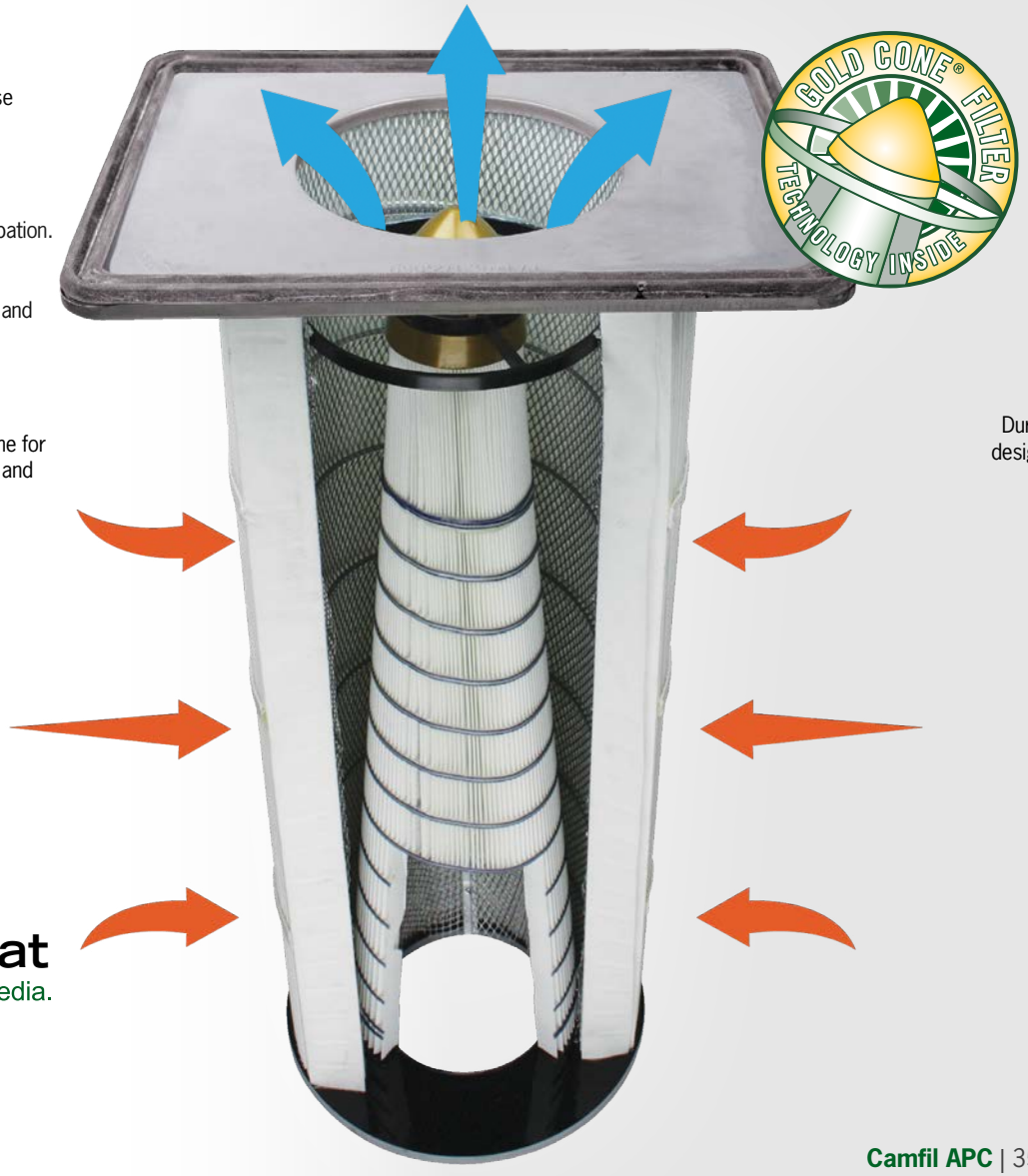
DPS - DuraPleat
Our spun-bonded, heavy-duty, all-purpose polyester media.

DPA - Aluminized
Our DuraPleat media with a conductive aluminized finish applied for static dissipation.

DPO - Hydro-Oleophobic
Our DuraPleat media coated with an oil and water repellent finish.

DPT - PTFE
Our DuraPleat media with a laminated polytetraflouroethylene (PTFE) membrane for very high efficiencies of fine particulate and superior dust cake release.

DuraPleat filters are rated MERV 10 up to MERV 16 (PTFE).



DURA pleat
The **MOST** Durable Filter Media.

GOLD CONE TECHNOLOGY

What it is: A patented, open bottom, pleated conical addition to the inside of a filter cartridge which adds more usable media. This configuration increases the amount of air each filter can clean.

What it does: Gold Cone technology evenly disperses the reverse pulse air during cleaning cycles, ejecting dust directly into the hopper. The effectiveness of every pulse along with more media, makes your filters last longer and use less compressed air, saving you money!

DURAPLEAT TECHNOLOGY

DuraPleat media is made of **100% spun bond polyester** in a pleated design that combines **the best of both worlds**: the **high efficiency** of pleated media and the **versatility** of synthetic materials.

Filter cartridges with DuraPleat technology **capture and release more pollutants** when pulsed, resulting in a **safer, cleaner work environment** with less maintenance.

KEY BENEFITS

Meets widest range of tough application challenges; handles difficult dusts

Washable media may be resused in many applications

Exceptionally rugged, long-lasting

Vertically integrated cartridge for better dust release and ease of removal and installation

© Camfil APC, Product Sheet / DuraPleat Gold Cone /03-21-2016-1667 — External Use

Camfil APC | 3505 S. Airport Road, Jonesboro, AR 72401 | 870-933-8048
www.camfilapc.com | e-mail: filterman@camfil.com | 800-479-6801

DESCRIPTION	SIZE (A x B) (in inches)	CAPACITY (CFM) @ 1.35 IN. W.G.	PART NUMBER
01XH-21Z36Z12-CD-3-C-A-5B-0/00	21 x 36 x 11-1/2	2650	855211367

MATERIAL NOTES:

1. FILTER MEDIA: MICRO-GLASS FIBER / ACRYLIC RESIN BINDER
2. SEPARATOR MAT'L: TAPER/CORRUGATED, 0.0015 THICK, 1145 ALUMINUM
3. FRAME MAT'L: 16 GAUGE GALVANNEALED STEEL
4. SEALANT MAT'L: FIRE RETARDANT/PHOSPHORUS FREE TWO PART POLYURETHANE
5. GASKET MAT'L: NEOPRENE, 1/4x3/4, DOWNSTREAM
6. SCREEN MAT'L: 24 GAGE WHITE POWDER COATED STEEL (62% O.A.), BOTH SIDES

TESTING NOTES:

1. EACH FILTER SHALL BE TESTED FOR EFFICIENCY IN ACCORDANCE WITH IEST-RP-CC-007.
2. FILTER MEETS IEST-RP-CC001 TYPE H PERFORMANCE LEVEL.

FILTER SPECIFICATIONS:

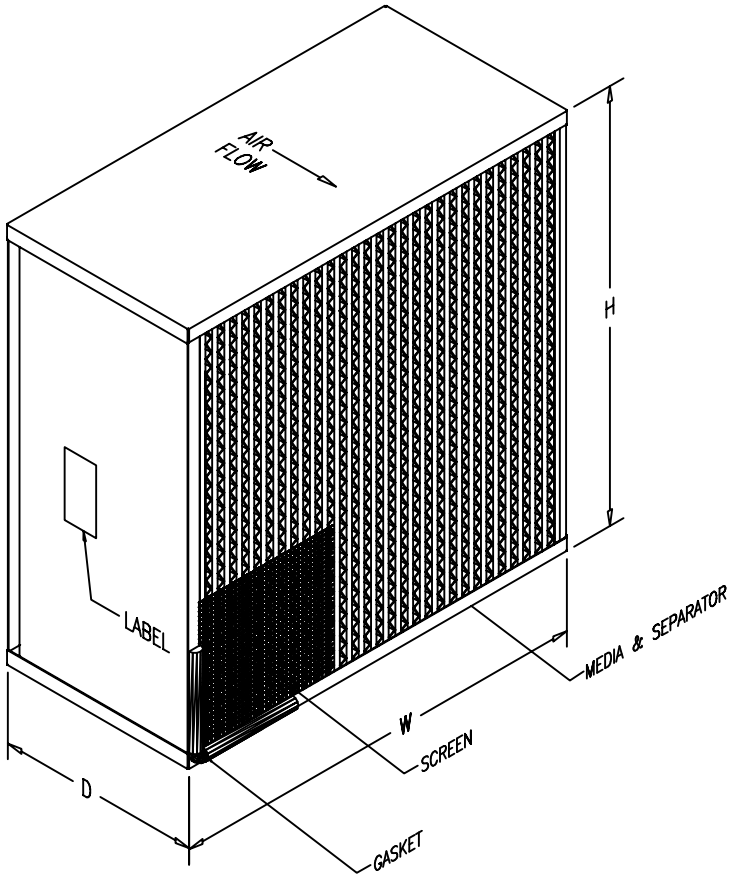
PLEAT DEPTH (IN): 10-1/2 NOMINAL
EFFICIENCY: 99.97% MIN vs 0.2-0.3 micron
MAX. OPERATING TEMP: 200 °F
MAX. REL. HUMIDITY: 99%

UL RATINGS:

1. FILTERS MEET UL-586 AND UL-900

FRAME TOLERANCES:

LENGTHS: +0, -1/8"
DIAGONALS: WITHIN 1/8" TOTAL ALLOWANCE FOR DIAGNALS < 30 in.
WITHIN 1/4" TOTAL ALLOWANCE FOR DIAGNALS ≥ 30 in.



CUSTOMER APPROVAL BLOCK

YOUR APPROVAL OF THIS PRINT AUTHORIZES CAMFIL FARR TO PROCEED WITH MATERIAL PROCUREMENT, TOOLING AND PRODUCT FABRICATION. ANY CHANGES MADE AFTER APPROVAL MAY INCUR FURTHER EXPENSES TO THE CUSTOMER

☐ OK AS IS ☐ SEND REVISED DWG.

SIGNATURE/DATE

©Camfil Farr http://www.camfilfarr.com

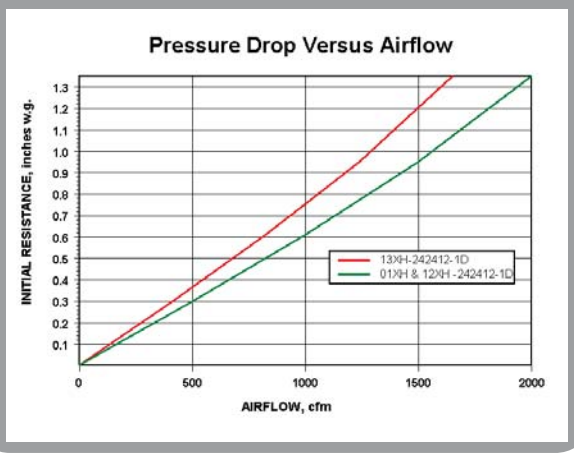
DESCRIPTION
CUSTOM ABSOLUTE
X SERIES

APPROVED BY:	DATE:	DRAWN BY:	DATE:	SHEET	DRAWING NUMBER	REV.
JC	12/16/09	JP	12/16/09	1 of 1	504081	-

Absolute® XH

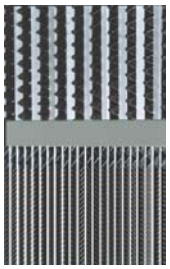
High Capacity X-Body Construction HEPA Filter

Tapered separators allow increased media area for energy savings or more airflow in air-starved systems.



Camf l high-capacity Absolute f lters are manufactured from the highest quality components, under demanding quality control conditions, and are certif ed to ensure performance in the most critical of applications. The XH is available in eff ciencies from 99.97% to 99.999% on 0.3 micron particles. The XH is your choice for HEPA level air f ltration in applications wherein ultra-clean air, increased airf ow capacity and energy-savings are critical. Each Camf l XH Absolute includes:

- A galvannealed 16-gauge steel frame to create a durable, dimensionally stable corrosion-resistant enclosure.
- X-body frame that is assembled without the use of penetrating fasteners to ensure leak-free performance throughout the life of the f lter. Our unique urethane potting process completely encapsulates the f lter pack within the enclosing frame.
- Safe-edge tapered corrugated aluminum separators (allowing up to 88% more media area than standard HEPA f lters) to ensure uniform airf ow throughout the media pack and maintain pack stability. The edges of the separators are hemmed for added strength and to protect the media from damage during manufacture, shipping and installation.



Standard separators versus tapered separators

- Micro glass f ber media to provide eff ciency to specif ed performance values. The media is highly resistant to moisture in high humidity environments.
- A one-piece seamless urethane gasket to ensure a leak-free f lter-to-holding mechanism seal. (A neoprene dove-tailed juncture gasket is also available).

Every Camf l Absolute f lter is individually tested per IEST Recommended Practice IEST-RP-CC001 (Type H, J or F). Each unit is labeled noting tested eff ciency, penetration, rated and performing airf ow, pressure drop and a unique serial number for unit tracking and quality assurance.

Absolute® XH

High Capacity X-Body Construction HEPA Filter

Performance

Model	Efficiency	Nominal Size (inches)	Airflow Capacity @ 1.35" w.g.	Media Area (sq. ft.)	Shipping Weight (lbs.)
01XH-12Z12Z12- ** -3-C-A-00-0/00	99.97% @ 0.3 micron IEST Type A	12 x 12 x 11.50	430	67.5	23.6
01XH-23F11F12- **-3-C-A-00-0/00		23.38 x 11.38 x 11.50	850	134.6	30.8
01XH-24Z12Z12- ** -3-C-A-00-0/00		24 x 12 x 11.50	930	145.5	32.0
01XH-11F23F12- ** -3-C-A-00-0/00		11.38 x 23.38 x 11.5	850	134.6	34.7
01XH-12Z24Z12- ** -3-C-A-00-0/00		12 x 24 x 11.50	930	145.5	35.6
01XH-23F23F12- ** -3-C-A-00-0/00		23.38 x 23.38 x 11.50	1890	287.5	47.5
01XH-24Z24Z12- ** -3-C-A-00-0/00		24 x 24 x 11.50	2000	301	48.5
12XH-12Z12Z12- ** -3-C-A-00-0/00	99.99% @ 0.3 micron IEST Type C	12 x 12 x 11.50	430	67.5	23.6
12XH-23F11F12- **-3-C-A-00-0/00		23.38 x 11.38 x 11.50	850	134.6	30.8
12XH-24Z12Z12- ** -3-C-A-00-0/00		24 x 12 x 11.50	930	145.5	32.0
12XH-11F23F12- ** -3-C-A-00-0/00		11.38 x 23.38 x 11.5	850	134.6	34.7
12XH-12Z24Z12- ** -3-C-A-00-0/00		12 x 24 x 11.50	930	145.5	35.6
12XH-23F23F12- ** -3-C-A-00-0/00		23.38 x 23.38 x 11.50	1890	287.5	47.5
12XH-24Z24Z12- ** -3-C-A-00-0/00		24 x 24 x 11.50	2000	301	48.5
13XH-12Z12Z12- ** -3-C-A-00-0/00	99.999% @ 0.3 micron IEST Type D	12 x 12 x 11.50	350	67.5	23.6
13XH-23F11F12- **-3-C-A-00-0/00		23.38 x 11.38 x 11.50	700	134.6	30.8
13XH-24Z12Z12- ** -3-C-A-00-0/00		24 x 12 x 11.50	770	145.5	32.0
13XH-11F23F12- ** -3-C-A-00-0/00		11.38 x 23.38 x 11.50	700	134.6	34.7
13XH-12Z24Z12- ** -3-C-A-00-0/00		12 x 24 x 11.50	770	145.5	35.6
13XH-23F23F12- ** -3-C-A-00-0/00		23,38 x 23.38 x 11.50	1550	287.5	47.5
13XH-24Z24Z12- ** -3-C-A-00-0/00		24 x 24 x 11.50	1650	301	48.5

DATA NOTES:

Maximum operating temperature 175° F (80° C). If neoprene gasket is used temperature limitation is 200° F (90° C).
The Camfil Absolute is listed by Underwriters Laboratories as UL 900.
IEST—Institute of Environmental Sciences & Technology. CEN conversions are available on the Camfil web site.
Replace ** in model number with 00 for no gasket, 1D for one gasket downstream, 1U for one gasket upstream, or 1B for a gasket on both sides.

Options:

Optional construction materials include paper separators and alternate framing materials. Contact factory for pricing and availability.

Specification

1.0 General

1.1 · Air filters shall be HEPA grade high-capacity air filters with waterproof micro glass fiber media, tapered corrugated aluminum separators, urethane sealant, a galvannealed 16-gauge steel enclosing frame, and (neoprene sealing gasket, seamless gasket)*.

1.2 · Sizes shall be as noted on drawings or other supporting materials.

2.0 Construction

2.1 · Filter media shall be one continuous pleating of micro glass fiber media.

2.2 · Pleats shall be uniformly separated by tapered corrugated aluminum separators incorporating a hemmed edge to prevent damage to the media.

2.3 · The media pack shall be potted into the enclosing frame through the use of a urethane sealant.

2.4 · The enclosing frame shall be of galvannealed 16-gauge steel, shall be bonded to the media pack to form a rugged and durable enclosure. The filter shall be assembled without the use of fasteners to ensure no frame penetrations. Overall dimensional tolerance shall be correct within -1/8", +0", and square within 1/8".

2.5 · A poured-in-place seamless sealing gasket shall be included on the downstream side of the enclosing frame to form a positive seal upon installation.

3.0 Performance

3.1 · The filter shall have a tested efficiency of (99.97%, 99.99%, 99.999%)* when evaluated under the guidance of IEST Recommended Practice RP-CC001.

3.2 · Initial resistance to airflow shall not exceed 1.35" w.g. at rated capacity.

3.3 · Filter shall be listed by Underwriters Laboratories as UL 900.

3.4 · The filter shall be capable of withstanding 10" w.g. without failure of the media pack.

* Items in parentheses ( ) require selection.

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camfil ISO 9001:2008 Certified Quality System

Camfil has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.

U.S. GREEN BUILDING COUNCIL MEMBER

Camfil | 1 North Corporate Drive, Riverdale, NJ 07457 | Tel: (973) 616-7300

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

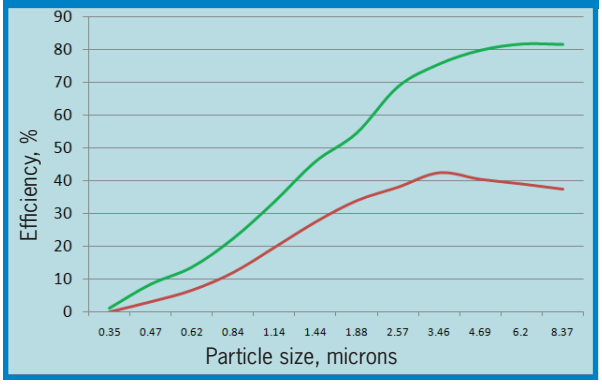
Supporting Information

FEU-1 Filter System

30/30®

High-Capacity MERV 8 Pleated Panel Filter

The best performing pleated panel filter — guaranteed!



Composite minimum efficiency values of the 30/30 when evaluated per ASHRAE Standard 52.2-2007. The 30/30 has a MERV of 8 and MERV-A of 8 when tested per appendix J.

This line is representative of a MERV 8 filter that uses electret media enhancement to obtain a MERV 8. The values are after approximately two weeks of operation.

The Camfil Farr 30/30 has set the industry standard for pleated panel filters since 1963. With over 45 design enhancements, it continues to provide the industry's best value for medium efficiency filtration.

Setting the standard by which other pleated filters are judged, modern media manufacturing techniques and proprietary technological advancements ensure that the Camfil Farr 30/30 is:

- *Guaranteed to perform at the rated efficiency, or better, throughout the life of the filter.*
- *Guaranteed to last longer than any other pleated panel filter available.*

Performing at MERV 8, using a mechanical particle capture principle, the 30/30 will not drop in efficiency while in service as will other pleated panel filters that incorporate an electret charge to obtain a MERV 8 value.

Its radial pleat design provides the longest life and lowest average pressure drop reducing the number of filter changes so your facility will use less fan power to move air through the filter.

The high wet-strength beverage frame and welded wire media backing provide structural integrity in any type of HVAC application virtually eliminating the additional costs associated with filter bypass or filter failure.

Available in 1", 2" or 4" deep configurations, the 30/30 is ideal for commercial, industrial, institutional or any other application where the ultimate level of protection of equipment and indoor air quality is a concern.

The Camfil Farr 30/30 has an Energy Cost Index (ECI) of five stars, the highest performance rating available.

[1] A 5-star rating indicates that this filter performs in the top 20% of all products of similar construction in the HVAC industry. Factors of consideration include maintained efficiency, energy usage and resistance to air flow. Detailed evaluation information is available from your Camfil Farr sales outlet or on the web at www.camfilfarr.com.

Camfil Farr	Product Sheet
30/30®	1002 - 0608
Camfil Farr - clean air solutions	

Camfil Farr 30/30®

The highest media weight, more than any other pleated panel f lter, and uniform lofting for high dust holding capacity, ensure that the 30/30 will last longer in any HVAC application.

Exclusive MERV 8 Performance from Camfil Farr Media

The 30/30 media is manufactured from a proprietary blend of fibers that incorporate a mechanical principle of particle capture. The filter does not require an electret charge which would dissipate and reduce filter's efficiency after minimal hours of operation in a system. The media is lofted to a uniform depth to enhance the depth-loading characteristic and ensure the longest life of any pleated filter available. The high-loft also offers a lower resistance to airflow so fan horsepower required to move air through the filter is minimized. Camfil Farr evaluates the quality of all incoming raw materials to maintain product integrity as part of a rigorous quality control program.

Welded Wire Grid Maintains Radial Pleat Design

The media is formed into a radial pleat for uniform dust loading and full use of the media area. V-style pleats blind while loading preventing full utilization of the media area and increasing the filters pressure drop resulting in increased energy usage. A welded wire grid, spot welded on one-inch centers maintains each radial pleat and maintains media stability through varying airflows.

Rounded radial pleats, instead of v-shape pleats, allow full usage of media area.

Diagonal support members, glued to each pleat at its apex, helps maintain pleat stability and f lter rigidity.

High Wet-Strength Beverage Board Frame

The high wet-strength beverage board frame, the thickest board in the industry, creates a stable and non-yielding media pack. Filter bypass is virtually eliminated because the filter fits securely in the filter holding mechanism. The media is bonded to the frame ensuring that all of the air seen by the filter will be treated by the filter. Diagonal support members are bonded to each pleat to maintain pleat spacing and add stability to the pack through bridge-style engineering. The 30/30 is guaranteed to 2.0" w.g. of pressure filter without failure. Costly filter blowouts and compromising of HVAC system cleanliness is eliminated.

ISO 9001:2000 Certified Quality Control

Every 30/30 filter is identified on the frame with a unique manufacturing code that allows us to analyze every component of construction from raw materials to the point where the product is boxed for shipping. Filters are inspected for structural integrity so they are capable of operating in the harshest HVAC system conditions. The adhesiveness of diagonal support members to pleat apexes is inspected so pleat spacing is uniform to provide longer filter life. Each media lot is laboratory tested to confirm consistent performance and individual filters are submitted from each manufacturing facility on a strict schedule for ASHRAE 52.2 testing in our world-class testing facility.

The standard of the industry, by Camfil Farr.

Used in many systems as a prefilter, the 30/30 extends the life of final filters by capturing larger contaminant and thereby allowing the final filters to concentrate on moving smaller particles such as those that are respirable and can cause lung damage. The 30/30 is also an excellent choice when applied as the only filter in a system to keep coils clean and maintain efficiency, and protect building occupants from contaminants of annoyance such as pollen, plant spores, atmospheric dusts and other indoor air irritants.

Unprecedented Industry Guarantee

If our filters don't outlast and outperform your current filters, we'll replace them, FREE.
For guarantee details and a distributor list, visit www.camfilfarr.com.

2” Deep Filter (actual filter depth 1.75”)

Part Number	Nominal Size (inches)	Actual Size (inches)				Initial Resistance (inches w.g.)	Total Media Area (sq. ft.)	Pleats per Linear Foot
		Height	Width	Depth	High			
049880-019	16 x 16 x 2	15.50	15.50	1.75	890	0.31	7.8	15 pleats per linear foot
049880-008	20 x 10 x 2	19.50	9.50		700		6.0	
049880-009	20 x 14 x 2	19.50	13.50		975		8.3	
049880-007	20 x 12 x 2	19.50	11.88		835		7.4	
049880-011	20 x 15 x 2	19.50	14.50		1045		9.3	
049880-001	20 x 16 x 2	19.50	15.50		1100		9.9	
049880-013	20 x 18 x 2	19.50	17.50		1250		10.8	
049880-002	20 x 20 x 2	19.50	19.50		1390		11.9	
402271-007	20 x 30 x 2	19.50	29.50		2085		18.2	
049880-006	24 x 12 x 2	23.38	11.38		1000		8.4	
049880-015	24 x 18 x 2	23.50	17.50		1500		13.0	
049880-012	24 x 20 x 2	23.50	19.50		1670		14.3	
049880-005	24 x 24 x 2	23.38	23.38		2000		17.3	
049880-010	25 x 14 x 2	24.50	13.50		1220		10.4	
049880-020	25 x 15 x 2	24.50	14.50		1300		11.6	
049880-016	24 x 16 x 2	24.50	15.50		1335		11.8	
049880-004	25 x 16 x 2	24.50	15.50		1390		12.4	
049880-014	25 x 18 x 2	24.50	17.50		1565		13.5	
049880-003	25 x 20 x 2	24.50	19.50		1740		14.9	
049880-018	25 x 25 x 2	24.50	24.50		2170		19	

1” Deep Filter (actual filter depth 0.88”)

Part Number	Nominal Size (inches)	Actual Size (inches)			Airflow Capacity (cfm)	Initial Resistance (inches w.g.)	Total Media Area (sq. ft.)	Pleats per Linear Foot
		Height	Width	Depth				
054862-018	10 x 10 x 1	9.50	9.50	0.88	240	0.23	1.6	16 pleats per linear foot
054862-025	12 x 12 x 1	11.50	11.50		350		2.5	
054862-027	16 x 12 x 1	15.50	11.50		470		3.3	
054862-012	16 x 16 x 1	15.50	15.50		620		4.3	
054862-009	20 x 7 x 1	19.50	6.50		340		2.4	
054862-016	20 x 10 x 1	19.50	9.50		490		3.3	
054862-019	20 x 12 x1	19.50	11.50		580		4.1	
054862-006	20 x 14 x 1	19.50	13.50		680		4.6	
054862-008	20 x 15 x 1	19.50	14.50		730		5.1	
054862-001	20 x 16 x 1	19.50	15.50		780		5.4	
054862-020	20 x 18 x 1	19.50	17.50		880		6.1	
054862-002	20 x 20 x 1	19.50	19.50		970		6.6	
054862-021	22 x 22 x 1	21.50	21.50		1180		8.2	
054862-022	24 x 10 x 1	23.50	9.50		580		4.0	
054862-010	24 x 12 x 1	23.50	11.50		700		4.9	
054862-026	24 x 14 x 1	23.50	13.50		820		5.5	
054862-015	24 x 16 x 1	23.50	15.50		970		6.7	
054862-028	24 x 18 x 1	23.50	17.50		1050		7.3	
054862-011	24 x 20 x 1	23.50	19.50		1165		8.0	
054862-005	24 x 24 x 1	23.50	23.50		1400		9.8	
054862-023	25 x 10 x 1	24.50	9.50		610		4.1	
054862-024	25 x 12 x 1	24.50	11.50		730		5.2	
054862-007	25 x 14 x 1	24.50	13.50		850		5.7	
054862-013	25 x 15 x 1	24.50	14.50		910		6.4	
054862-004	25 x 16 x 1	24.50	15.50		970		6.7	
054862-017	25 x 18 x 1	24.50	17.50		1100		7.6	
054862-003	25 x 20 x 1	24.50	19.50		1215		8.3	
054862-014	25 x 25 x 1	24.50	24.50		1520		10.5	

Data Notes:
1.0” w.g. recommended final resistance for all depths. System design may dictate an alternative changeout point. Contact factory for guidance.
Has been qualified by Underwriters Laboratories as UL Class 2.
Maximum operating temperature 200º F (93º C).
2” and 4” deep filters rated at 250 feet per minute (fpm) medium and 500 fpm high. 1” deep filter’s rated at 175 fpm medium and 350 fpm high.
For product specification in RTF format please go to www.camfilfarr.com.

4” Deep Filter (actual filter depth 3.75”)

Part Number	Nominal Size (inches)	Actual Size (inches)			Airflow Capacity (cfm)	Initial Resistance (inches w.g.)	Total Media Area (sq. ft.)	Pleats per Linear Foot
		Height	Width	Depth				
059413-004	20 x 16 x 4	19.38	15.38	3.75	1100	0.27	15.7	11 pleats per linear foot
059413-003	20 x 20 x 4	19.38	19.38		1390		18.9	
059413-002	24 x 12 x 4	23.38	11.38		1000		13.9	
059413-009	24 x 18 x 4	23.38	17.38		1500		20.2	
059413-008	24 x 20 x 4	23.38	19.38		1670		22.7	
059413-001	24 x 24 x 4	23.38	23.38		2000		27.7	
059413-005	25 x 16 x 4	24.38	15.38		1390		19.7	
059413-006	25 x 20 x 4	24.38	19.38		1740		23.6	
059413-010	25 x 25 x 4	24.38	24.38		2170		30.0	
059413-007	25 x 29 x 4	24.38	28.38		2520		35.4	

Data Notes:
1.0” w.g. recommended final resistance for all depths. System design may dictate an alternative changeout point. Contact factory for guidance.
30/30 has been qualified by Underwriters Laboratories as UL Class 2.
Maximum operating temperature 200° F (93° C).
2” and 4” deep filters are rated at 250 feet per minute (fpm) medium and 500 fpm high. 1” deep filters are rated at 175 fpm medium and 350 fpm high.

4” deep 30/30 is available with a header for side-access housing installation. Request Product Sheet 1003.

Available in UL Class One for locations having this building code requirement. Request Product Sheet 1002CL1.

1.0 General

1.1 - Air filters shall be medium efficiency ASHRAE pleated panels consisting of cotton and synthetic media, welded wire media support grid, and beverage board enclosing frame.

1.2 - Sizes shall be noted on drawings or other supporting materials.

2.0 Construction

2.1 - Filter media shall be a cotton and synthetic blend, lofted to a uniform depth of 0.15”, and formed into a uniform radial pleat.

2.2 - A welded wire grid, spot-welded on one-inch centers and treated for corrosion resistance shall be bonded to the downstream side of the media to maintain radial pleats and prevent media oscillation.

2.3 - An enclosing frame of no less than 28-point high wet-strength beverage board shall provide a rigid and durable enclosure. The frame shall be bonded to the media on all sides to prevent air bypass. Integral diagonal support members on the air entering and air exiting side shall be bonded to the apex of each pleat to maintain uniform pleat spacing in varying airflows.

3.0 Performance

3.1 - The filter shall have a Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2-2007. It shall also have a MERV-A of 8 when tested per Appendix J of the same standard. The media shall maintain or increase in efficiency over the life of the filter.

3.2 - Initial resistance to airflow shall not exceed 0.31” for a 2” deep, 0.23” for a 1” deep, or 0.27” for a 4” deep filter at respective velocities of 500, 350 or 500 fpm.

3.3 - The filter shall be classified by Underwriters Laboratories as UL Class 2.

3.4 - Manufacturer shall guarantee the integrity of the filter pack to 2.0” w.g.

3.5 - Manufacturer shall provide evidence of facility certification to ISO 9001:2000.

Supporting Data - Provide product laboratory test report for each depth listed including all details as prescribed in ASHRAE Standard 52.2-2007 including appendix J.

Camfil Farr has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.

Camfil Farr, Inc.
United States Tel: (973) 616-7300 Fax: (973) 616-7771
Canada Tel: (450) 629-3030 Fax: (450) 662-6035
E-mail: camfilfarr@camfilfarr.com

© Camfil Farr http://www.camfilfarr.com

MODEL DESIGNATION	DIMENSIONS TO OUTER FLANGE (in inches) A x B x C	PART NUMBER	CFM	EFF.	"W.G.
FA1560-01-01-04	24 X 24 X 11-1/2	855010066	2400	99.99	1.0
FA1560-05-01-04	24 X 24 X 11-1/2	855010070	2400	99.97	1.1

MATERIAL NOTES:

1. FILTER MEDIA: MICRO-GLASS FIBER / ACRYLIC RESIN BINDER
2. SEPARATOR MAT'L: GLASS FIBER SPACED @ 22mm INTERVALS
3. FRAME MAT'L: 6063-T5 ANODIZED ALUMINUM
4. SEALANT MAT'L: FIRE RETARDANT/PHOSPHORUS FREE TWO PART POLYURETHANE
5. GASKET MATERIAL: SEAMLESS FOAM GASKET, UPSTREAM

TESTING NOTES:

1. EACH FILTER SHALL BE TESTED FOR EFFICIENCY IN ACCORDANCE WITH IEST-RP-CC-007.

FILTER SPECIFICATIONS:

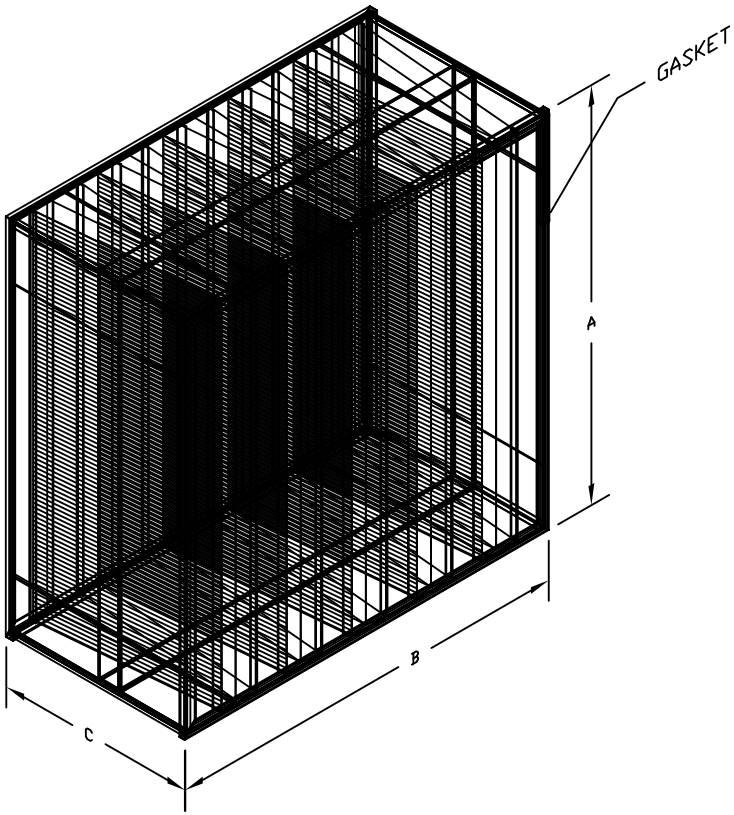
PLEAT DEPTH (IN): 27.5mm
EFFICIENCY: SEE TABULATION
MAX. OPERATING TEMP: 155° F
MAX. REL. HUMIDITY: 99%

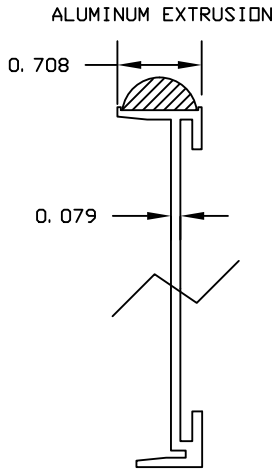
UL RATINGS:

1. FILTERS MEET UL-586 AND UL-900

FRAME TOLERANCES:

LENGTHS: +0, -1/16"
DIAGONALS: WITHIN 1/8" TOTAL ALLOWANCE FOR DIAGNALS < 30 in.
WITHIN 1/4" TOTAL ALLOWANCE FOR DIAGNALS ≥ 30 in.





CUSTOMER APPROVAL BLOCK

YOUR APPROVAL OF THIS PRINT AUTHORIZES CAMFIL FARR TO PROCEED WITH MATERIAL PROCUREMENT, TOOLING AND PRODUCT FABRICATION. ANY CHANGES MADE AFTER APPROVAL MAY INCUR FURTHER EXPENSES TO THE CUSTOMER

☐ OK AS IS ☐ SEND REVISED DWG.

SIGNATURE/DATE

©Camfil Farr http://www.camfilfarr.com

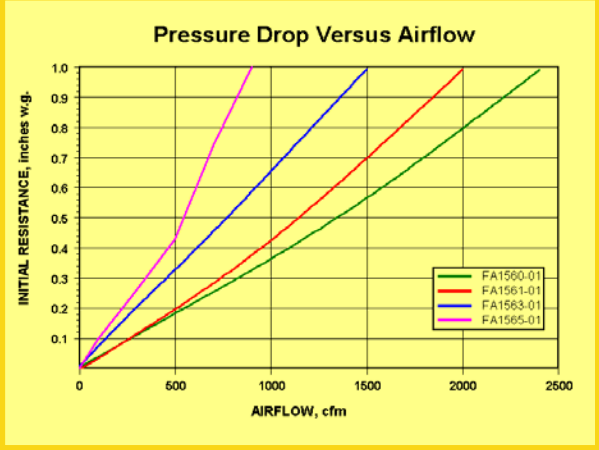
DESCRIPTION
CUSTOM FILTRA 2000
FA1560 SERIES

APPROVED BY:	DATE:	DRAWN BY:	DATE:	SHEET	DRAWING NUMBER	REV.
JC	7/29/10	JC	7/29/10	1 of 1	502374	-

filtra 2000™

High-Capacity V-Style Absolute Filter with Airflow Capacity to 2400 CFM

Critical airflow and energy savings are optimized, operating at airflow capacities of up to 2400 cfm.

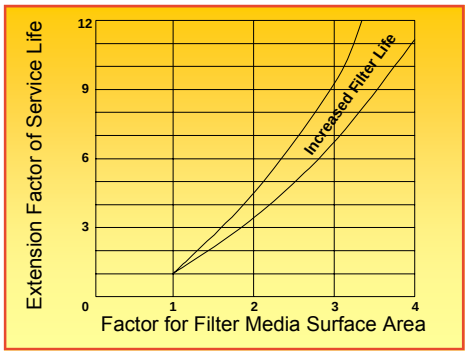


The Camfil Farr Filtra 2000™ provides high-efficiency particulate air filtration for critical application processes. With more than double the media of standard HEPA filters, critical airflow and energy savings are always optimized. Available in airflow capacities up to 2400, the Filtra 2000 includes:

- Wet-laid water-resistant micro fiber glass media capable of withstanding up to 99% relative humidity
- Multiple high-efficiency media packs in a V-bank design optimized for low configuration loss and optimum airflow
- Low initial resistance to airflow of 1.0" w.g. at rated capacity
- CMS™ - Exclusive *controlled media spacing*™, a Camfil Farr manufacturing method that ensures uniform airflow throughout the entire media pack
- Up to 431 square feet of media, resulting in lower average pressure drop, longer periods between changes and lower disposal costs. The Filtra 2000 may offer 3-4 times the life of a standard absolute filter
- A one-piece seamless urethane gasket to ensure a leak-free filter-to-holding mechanism seal. (A neoprene dove-tailed gasket is also available)
- Installs in any standard HEPA mounting system without modifications (may require alternate fasteners)
- Each unit is individually tested and certified (serialized on the product label) noting actual tested performance values.

The Camfil Farr Filtra 2000 applications include medical facilities, pharmaceuticals, semiconductor facilities, food processing plants and other locations where ultra clean air and critical filter performance is required.

Increasing filter surface area by 50% can increase filter life by 100%. A filter with twice the surface area can last 3 to 4 times as long.

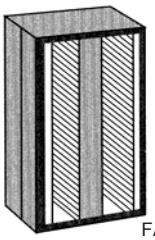


Camfil Farr	Product sheet
Filtra 2000™	1823 - 0606
Camfil Farr—clean air solutions	

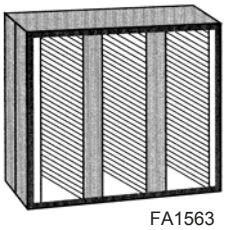
PERFORMANCE DATA

FILTRA 2000™

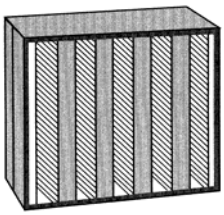
Model	Efficiency	Nominal Size (inches)	Airflow (cfm)	Resistance @ Airflow (inches w.g.)	Media Area (sq. ft.)	Shipping Weight (lbs.)
FA 1565-03-01	95% @ 0.3 Micron	24 x 12 x 11.50	900	0.50	174	22
FA 1563-03-01		24 x 24 x 11.50	1500		237	26
FA 1561–03-01		24 x 24 x 11.50	2000		390	35
FA 1560–03-01		24 x 24 x 11.50	2400		431	40
FA 1565-01-01	99.99% @ 0.3 Micron	24 x 12 x 11.50	900	1.0	174	22
FA 1563-01-01		24 x 24 x 11.50	1500		237	26
FA 1561–01-01		24 x 24 x 11.50	2000		390	35
FA 1560–01-01		24 x 24 x 11.50	2400		431	40
FA 1565-02-01	99.999% @ 0.3 Micron	24 x 12 x 11.50	693	1.0	174	22
FA 1563-02-01		24 x 24 x 11.50	1155		237	26
FA 1561–02-01		24 x 24 x 11.50	1540		390	35
FA 1560–02-01		24 x 24 x 11.50	1848		431	40



FA1565



FA1563



FA1561
FA1560

DATA NOTES:
Dimensions are actual and do not include gasket.
Maximum operating temperature 175° F (80° C). If neoprene gasket is used temperature limitation is 200° F (90° C).
All materials are fire-retardant and self-extinguishing The Filtra 2000 meets UL 586 and UL 900 Class 2.
IEST—Institute of Environmental Sciences & Technology. CEN conversions are available on the Camfil Farr web site.

Additional sizes are available. Consult factory for availability and pricing.
Filtra 2000 filters are also available with gel-seal.

SPECIFICATIONS

1.0 General

1.1 - Air filters shall be absolute grade HEPA filters consisting of pleated media packs assembled in a V-bank configuration, polyurethane sealant, anodized aluminum enclosure and seamless sealing gasket.
1.2 - Sizes shall be as noted on enclosed drawings or other supporting materials.

2.0 Construction

2.1 - Filter media shall be micro fiber glass formed into minipleat pleat-in-pleat V-bank design.
2.2 - The media packs shall be potted into the enclosing frame with fire retardant polyurethane sealant.
2.3 - An enclosing frame of anodized extruded aluminum shall form a rugged and durable enclosure.
2.4 - A seamless sealing gasket shall be included on the downstream side of the filter to form a positive seal upon installation.

3.0 Performance

3.1 - Filter efficiency at 0.3 micron shall be (95%, 99.99%, 99.999%)* when evaluated according to the IEST Recommended Practice for applicable type. Each filter shall be labeled as to tested performance.
3.2 - Initial resistance shall not exceed 1.0" w.g. at rated capacity. (0.50" w.g. for 95%)*.
3.3 - Filter must be listed as UL 586 and UL 900 Class 2 per Underwriters Laboratories.
3.4 - Manufacturer shall provide evidence of facility certification to ISO 9001:2000.

** Items in parentheses ( ) require selection.*

Camfil Farr has a policy of uninterrupted research, development and product improvement. We reserve the right to change designs and specifications without notice.

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Canada Tel: (450) 629-3030 Fax: (450) 662-6035
E-mail: camfilfarr@camfilfarr.com

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http://www.camfilfarr.info
http://www.camfilfarr.com

camfil FARR
Certified Quality System
ISO 9001:2000

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

PUBLIC NOTICE

Forms and Documentation

City of Albuquerque

Environmental Health Department
Air Quality Program

Pre-Permit Application Meeting Checklist

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. Prior to submitting an application, the applicant shall contact the department in writing and request a pre-application meeting for information regarding the contents of the application and the application process. This checklist is provided to aid the applicant and **a copy must be submitted with the application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Name: _Modification to CTS's ATC Permit #217-M5 to add new emissions control and mass emissions permit limit basis.
Contact: _John Wakefiled, Environmental, Health, and Safety Engineer, (505) 348-4252 ____
Company/Business: _CTS Electronic Components, Inc., 4800 Alameda Blvd. NE, in Albuquerque, NM 87113_

☑ Fill out and submit a Pre-Permit Application Meeting Request form
⇒ Available online at http://www.cabq.gov/airquality
Submitted filled form to AQD via email on 8/23/16.

☑ Emission Factors and Control Efficiencies
Notes: *Emissions for process equipment based on engineering testing. Emission from the non-process comfort heating equipment based on AP42 natural gas combustion emission factors. Control efficiencies of the new and existing high-efficiency dust collectors based on manufacturer data.*

☑ Air Dispersion modeling guidelines and protocol
Notes: *Modeling on process emissions done in accordance with AQP's modeling policy and protocol requirements*

☑ Department Policies
Notes: *Air dispersion modeling on process emissions done in accordance with AQP's modeling policy requirements*
.

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

☑ Air quality permit fees
Notes: *Based on new 2016 Fee Checklist should be $1,632 for emissions >5 tpy and <25 tpy*.

☑ Public notice requirements – will do and document before applying for Construction Permit.

- Replacement Part 41 Implementation
  - *20.11.41.*13 B. Applicant's public notice requirements
    - ☑ Providing public notice to neighborhood association/coalitions
      - Neighborhood associations: *Email sent to the following neighborhood association/coalitions on 8/31/16*:
        - *Alameda North Valley*
        - *North Edith Corridor*
        - *Wildflower Area*
        -
      - Coalitions:
        - *North Valley Coalition*
        - *Coalition of Neighborhood Association, District 4*

        Notes: Obtained neighborhood assn. and coalition email addresses from Regan Eyerman of AQP on 8/29/16.

    - ☑ Posting and maintaining a weather-proof sign
      Notes: *Posted public notice sign in publicly visible and accessible location on August 31, 2016. See attached posted sign photo below.*

☑ Regulatory timelines

- 30 days to rule application complete
- 90 days to issue completed permit
- Additional time allotted if there is significant public interest and/or a significant air quality issue
  - Public Information Hearing
  - Complex permitting action

Notes:

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

Pre-Permit Application Meeting Request Form

Air Quality Program- Environmental Health Department

Please complete appropriate boxes and email to aqd@cabq.gov or mail to:

Environmental Health Department
Air Quality Program
P.O. Box 1293
Room 3047
Albuquerque, NM 87103

Names: Vern Hershberger of Trinity Consultants, Inc.	
Company/Organization: CTS Electronic Components, Inc. 4800 Alameda Blvd. NE Albuquerque, NM 87113	
Point of Contact: Vern Hershberger (phone number and email): **Preferred form of contact (circle one):** Phone E-mail	Phone: 505-266-6611 Email: vhershberger@trinityconsultants.com
Preferred meeting date/times: Over the phone & email between August 24-26, 2016.	
Description of Project: Permit modification to install new emissions control equipment and convert existing ATC Permit #517-M5 from production batching basis to mass emissions rate basis and update it. Please email Trinity/Vern the list of registered N.A. and C.A. reps within a ½-mile radius of CTS's 4800 Alameda Blvd. NE address related to the aerial pictures of the plant location below.	

CTS Electronics
Wilshire Ave NE
Brook PI NE
Stream Ct NE
Google earth

CTS Electronics
Google earth

Richard J. Berry, Mayor

Environmental Health Department

Air Quality Program

Interoffice Memorandum

Mary Lou Leonard, Director

TO: VERN HERSHBERGER, TRINITY CONSULTANTS, INC

FROM: YOLANDA MONTOYA, SENIOR ADMINISTRATIVE ASSISTANT, ENVIRONMENTAL HEALTH

SUBJECT: DETERMINATION OF NEIGHBORHOOD ASSOCIATIONS AND COALITIONS WITHIN 0.5 MILES OF 4800 ALAMEDA BLVD NE, ALBUQUERQUE, NM 87113

DATE: 8/24/2016

DETERMINATION:

On 8/24/2016 I used the City of Albuquerque Zoning Advanced Map Viewer (http://sharepoint.cabq.gov/gis) to review which City of Albuquerque Neighborhood Associations (NAs) and Neighborhood Coalitions (NCs) are located within 0.5 miles of the CTS Electronic Components, Inc. facility at 4800 Alameda Blvd NE, Albuquerque, NM 87113 in Bernalillo County.

I then used the City of Albuquerque Office of Neighborhood Coordination Monthly Neighborhood Association List dated August 5, 2016 to determine the contact information for each NA and NC populated by the Zoning Advanced Map Viewer.

Duplicates have been deleted. Contact information is as follows:

COA Association or Coalition	Name	Email or Mailing Address
North Valley Coalition	Peggy Norton	nvcabq@gmail.com
North Valley Coalition	Doyle Kimbrough	newmexmba@aol.com
Coalition of Neighborhood Association, District 4	Michael Pridham	michael@drpridham.com
Coalition of Neighborhood Association, District 4	Tony Huffman	thuffman663@comcast.net
Alameda North Valley	Steve Wentworth	anvanews@aol.com
Alameda North Valley	Mark Rupert	mwr505@hotmail.com
North Edith Corridor	Bob Warrick	rlwarric@centurylink.net
North Edith Corridor	Christine Benavidez	christinebnvdz@aol.com
Wildflower Area	Larry T Caudill	ltcaudill@comcast.net
Wildflower Area	Jim Jansen	jansenjames47@yahoo.com

Notice of Intent to Construct

Under 20.11.41.13B NMAC, the owner/operator is required to *provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are with-in one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located* if they propose to construct or establish a new facility or make modifications to an existing facility that is subject to 20.11.41 NMAC – Construction Permits. **A copy of this form must be included with the application.**

Applicant's Name and Address: CTS Electronic Components, Inc.

Owner / Operator's Name and Address: CTS Electronic Components, Inc., 4800 Alameda Blvd. NE, Albuquerque, NM 87113

Actual or Estimated Date the Application will be submitted to the Department: September 2016

Exact Location of the Source or Proposed Source: 4800 Alameda Blvd. NE, Albuquerque, NM 87113

Description of the Source: Piezoelectric ceramics and electronics manufacturing facility.

Nature of the Business: Manufacture of piezoelectric ceramics and electronics

Process or Change for which the permit is requested: Permit modification for the addition of new emissions control systems to reduce emissions and change the permit to a mass emissions rate basis.

Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

ATC Permit #0217-M5

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO	5.8	14.2
NOx	12.9	11.0
SO2	0.81	0.35
VOC	9.8	31.1
TSP	3.9	5.7
PM10	3.9	5.7
PM2.5	3.9	5.7
Pb	0.1510	0.373
VHAP	Not listed	Not listed

Net Changes In Emissions

(Only for permit Modifications or Technical Revisions)

	lbs/hr	tpy	Estimated Total TPY
CO	- 4.2	- 8.8	5.4
NOx	- 11.1	-4.7	6.3
SO2	- 0.57	+ 0.45	0.81
VOC	-3.9	-12.1	19.0
TSP	-3.2	-2.9	2.8
PM10	-3.2	-2.9	2.8
PM2.5	-3.2	-2.9	2.8
Pb	-0.1508	-0.372	0.00074
VHAP	0.51	2.2	2.2

Maximum Operating Schedule: 8,760 hours per year.

Normal Operating Schedule: 8,760 hours per year.

Current Contact Information for Comments and Inquires:

Ver.11/13

City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

Name: John Wakefield, Environmental Health and Safety Engineer.

Address: CTS Electronic Components, Inc., 4800 Alameda Blvd. NE, Albuquerque, NM 87113

Phone Number: (505) 348-4252

E-Mail Address: John.Wakefield@ctscorp.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager

Stationary Source Permitting

Albuquerque Environmental Health Department

Air Quality Program

PO Box 1293

Albuquerque, New Mexico 87103

(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, if required, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

Vern Hershberger

From: Vern Hershberger
Sent: Wednesday, August 31, 2016 11:22 AM
To: 'ltcaudill@comcast.net'; 'jansenjames47@yahoo.com'
Cc: 'Tavarez, Isreal L.'; Eyerman, Regan V.; John.Wakefield@ctscorp.com
Subject: RE: 20.11.41 NMAC required pre-permit application notice to neighborhood - with CTS phone # corrected
Attachments: CTS NOI form_1.3.pdf

Dear Neighborhood Association/Coalition Representatives,

The local air quality Construction Permit regulation 20.11.41 NMAC requires that registered representatives of neighborhood associations and coalitions within a half mile of a facility proposing to apply for an air quality permit application be notified in advance of permit application. Therefore, you are receiving the required attached public notice regarding CTS Electronic Components, Inc.'s proposed air quality permit modification application for installing new emissions control equipment and other improvements at their electronic components manufacturing facility located at 4800 Alameda Blvd.NE, Albuquerque, NM 87113.

Please see the attached revised *Notice of Intent to Construct* form (with corrected CTS phone #) for more information and directions if you might have related comments or questions.

Regards,

Vern Hershberger

Vern Hershberger, CHMM, LEED AP | Senior Consultant | **Trinity Consultants** | 9400 Holly Blvd NE, Building 3, Suite 300 | Albuquerque, NM 87122 |

Vern Hershberger

From: Vern Hershberger
Sent: Wednesday, August 31, 2016 11:20 AM
To: 'anvanews@aol.com'; 'mwr505@hotmail.com'
Cc: 'Tavarez, Isreal L.'; Eyerman, Regan V.; John.Wakefield@ctscorp.com
Subject: RE: 20.11.41 NMAC required pre-permit application notice to neighborhood - with CTS phone # corrected
Attachments: CTS NOI form_1.3.pdf

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Please see the attached revised *Notice of Intent to Construct* form (with corrected CTS phone #) for more information and directions if you might have related comments or questions.

Regards,

Vern Hershberger

Vern Hershberger, CHMM, LEED AP | Senior Consultant | **Trinity Consultants** | 9400 Holly Blvd NE, Building 3, Suite 300 | Albuquerque, NM 87122 |

Vern Hershberger

From: Vern Hershberger
Sent: Wednesday, August 31, 2016 11:18 AM
To: 'nvcabq@gmail.com'; 'newmexmba@aol.com'; 'michael@drpridham.com'; 'thuffman663@comcast.net'; 'rlwarric@centurylink.net'; 'christinebnvdz@aol.com'
Cc: 'Tavarez, Isreal L.'; Eyerman, Regan V.; John.Wakefield@ctscorp.com
Subject: RE: 20.11.41 NMAC required pre-permit application notice to neighborhood - with CTS phone # corrected
Attachments: CTS NOI form_1.3.pdf

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Please see the attached revised *Notice of Intent to Construct* form (with corrected CTS phone #) for more information and directions if you might have related comments or questions.

Regards,

Vern Hershberger

Vern Hershberger, CHMM, LEED AP | Senior Consultant | **Trinity Consultants** | 9400 Holly Blvd NE, Building 3, Suite 300 | Albuquerque, NM 87122 |

City of Albuquerque

Environmental Health Department
Air Quality Program

Public Notice Sign Guidelines

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. *Prior to submitting an application, the applicant shall post and maintain a weather-proof sign provided by the department. The applicant shall keep the sign posted until the department takes final action on the permit application; if an applicant can establish to the department's satisfaction that the applicant is prohibited by law from posting, at either location required, the department may waive the posting requirement and may impose different notification requirements.* **A copy of this form must be submitted with your application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Name: _ Modification to CTS's ATC Permit #217-M5 to add new emissions control and mass emissions permit limit basis
Contact:_ John Wakefiled, Environmental, Health, and Safety Engineer, (505) 348-4252_____
Company/Business: __CTS Electronic Components, Inc., 4800 Alameda Blvd. NE, in Albuquerque, NM 87113_

☑ The sign must be posted at the more visible of either the proposed or existing facility entrance (or, if approved in advance and in writing by the department, at another location on the property that is accessible to the public)

☑ The sign shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times.

☑ The lower edge of the sign board should be mounted a minimum of 2' above the existing ground surface to facilitate ease of viewing

☑ Attach a picture of the completed, properly posted sign to this document

☐ **Check here if the department has waived the sign posting requirement.**
Alternative public notice details:

Ver. 11/13

PROPOSED AIR QUALITY CONSTRUCTION PERMIT
1. Applicant's Name: CTS Electronic Components, Inc. Address: 4800 Alameda Blvd NE, Albuquerque, NM 87113
Owner or Operator's Name: CTS Electronic Components, Inc.
Owner or Operator's Address: 4800 Alameda Blvd NE, Albuquerque, NM 87113
Actual or Estimated Date the Application will be Submitted to the Department: September 2006
2. Exact Location of the Source or Proposed Source: 4800 Alameda Blvd NE, Albuquerque, NM 87113
3. Description of the Source: Piezoelectric ceramics and electronics manufacturing facility
Nature of the Business: Manufacture of piezoelectric ceramics and electronics.
Process or Change for which the permit is being requested: Permit modification to add new emissions control systems to reduce emissions and change the permit to a mass emissions rate basis.
Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:
Initial Construction Permit
	Pounds Per Hour (lbs/hr)	Tons Per Year (TPY)
CO	6.8	14.2
NOx	12.9	11.0
SO2	0.91	0.95
VOC	9.8	21.1
TSP	3.9	5.7
PM10	3.9	5.7
PM2.5	3.9	5.7
VHAP	Not Listed	Not Listed
Pb	0.010	0.373
Net Changes in Emissions
(for permit Modifications or Technical Revisions)
	Pounds Per Hour (lbs/hr)	Tons Per Year (TPY)	Estimated Total Tons Per Year
CO	-0.42	-0.8	5.4
NOx	-0.11	-0.4	6.3
SO2	-0.049	0.048	0.91
VOC	-0.37	-0.61	17.0
TSP	-0.22	-0.23	5.5
PM10	-0.22	-0.23	5.5
PM2.5	-0.22	-0.23	5.5
VHAP	—	0.01	0.01
Pb	-0.009	-0.373	0.00014
4. Maximum Operating Schedule: 8,760 hours per year
Normal Operating Schedule: 8,760 hours per year
5. Current Contact Information for Comments and Inquiries:
Name: John Walkenhorst, Environmental Health and Safety Engineer
Address: CTS Electronic Components, Inc. 4800 Alameda Blvd NE, Albuquerque, NM 87113
Phone Number: 505-349-3454 4252
E-Mail Address: John.Walkenhorst@ctscorp.com
City of Albuquerque - Environmental Health Department - Air Quality Program - Stationary Source Permitting
Phone Number (505) 768-1972 E-Mail Address: aq@cabq.gov
THIS SIGN SHALL REMAIN POSTED UNTIL THE DEPARTMENT TAKES FINAL ACTION ON THE PERMIT APPLICATION
CTS
Visitor Entrance
CAUTION AUTOMATIC DOOR
NO DELIVERIES
ACCEPTED IN FRONT LOBBY. PLEASE PROCEED TO RECEIVING.

CTS Electronic Components

Application to Modify ATC Permit #217-M5

November 2016

AIR DISPERSION MODELING

August 30, 2016

Air Dispersion Modeling Protocol

CTS Electronics

Facility Information

CTS Electronics is submitting an application to apply for a permit modification (pursuant to 20.11.41.29 NMAC) to its current air quality Authority to Construct Permit 217-M5. In this application, CTS Electronics proposed to modify their permit with the changes listed below.

- Updating dust collection controls
- Updating stack parameters

CTS Electronics seeks to demonstrate compliance with the New Mexico Ambient Air Quality Standards (NMAAQS) and National Ambient Air Quality Standards (NAAQS) for CO, NO_x, $PM_{2.5}$, PM_{10}, SO_2, lead, and TSP as well as the PSD Increment Standards for PM_{10}.

CTS Electronics manufactures ceramics for piezo-electronic components, SIC code 3679 and is located in Bernalillo County, New Mexico. The approximate UTM coordinates of the facility located in Zone 13 are 354,915 meters east and 3,894,595 meters north with WGS 84 datum at an elevation of approximately 5,127 feet above mean sea level.

An aerial image of the facility and emission points can be seen in Figure 1.

Figure 1. Aerial Image of CTS Facility.

Proposed Modeling

Model Input Options

The latest version of the AERMOD dispersion model, v15181, will be used for this analysis. The model will be executed for all applicable averaging periods in Regulatory Default mode for CO, $PM_{2.5}$, PM_{10}, SO_2, lead, and TSP to determine the impacts. NO_x modeling will be completed using Non-Regulatory Default mode to allow for the NMED approved use of ARM2 for conversion of NO_x to NO_2.

A building downwash analysis using the latest version of BPIP will be conducted and incorporated into the modeling analysis to account for potential effluent downwash due to facility structures.

Receptor Grid Description and Elevation Data

The center point of the facility will be designated at approximately 354,915 meters east and 3,894,595 meters north in Zone 13 and will serve as the center point for a variable receptor grid. A 50-meter grid spacing will extend from the fence line to 500 meters from the facility boundary in each direction for a fine grid resolution. A 100-meter grid spacing will extend from 500 meters to 1,000 meters in each direction for a medium grid resolution. A 250-meter grid spacing will extend from 1,000 meters to 2,500 meters in each direction for a coarse grid resolution. A 500-meter grid spacing will extend from 2,500 meters to 5,000 meters. A 1,000-meter grid spacing will extend from 5,000 meters to 20,000 meters. A 1,500-meter grid spacing will extend from 20,000 meters to 35,000 meters. A 2,000-meter grid spacing will extend from 35,000 meters to 50,000 meters.

In addition, a 5-meter grid spacing will be used to generate a facility boundary receptor array. These receptors surround the CTS building at approximately 1 m away from the building walls.

It is expected that the highest impacts from the proposed source will be at or near the facility area.

The elevations of receptors, structures, and facility sources will be determined using the most recent DEM data currently available.

Meteorological Data

The modeling of CTS will utilize the five-year Albuquerque (2001-2005) meteorological data set available on the City of Albuquerque website. We feel that this meteorological set is representative of meteorological conditions at the facility.

Significance Analysis and Cumulative Impact Analysis (CIA)

The modeled ground-level concentrations will be compared to the corresponding significant impact levels (SILs) to determine whether any modeled ground-level concentrations at any receptor locations are greater than the SIL (i.e., "significant" receptors). Based on preliminary modeling the only pollutants which exceed the SIL values are TSP, PM_{10}, and $PM_{2.5}$. Based on a phone conversation with Jeff Stonesifer on August 24, 2016, there are no surrounding sources which need to be included in CIA modeling, only background concentrations will be added.

PSD Class II Increment Analysis

If the results of the significance analysis for $PM_{2.5}$, PM_{10}, NO_2, and SO_2 indicate concentrations greater than the significance levels, PSD Class II increment analysis will be conducted for the appropriate pollutants and averaging periods. The minor source baseline dates as shown in Table 8 of the Modeling Guidelines[1] will be used. The predicted maximum concentrations will be compared with the appropriate Class II PSD standards.

PSD Class I Areas Analysis

The nearest Class I area is Cibola National Forrest at 127.4 km from the facility. Class I area analysis is not applicable as the national park is not within the 100 km inclusion zone.

[1] New Mexico Environment Department – Air Quality Bureau, **Air Dispersion Modeling Guidelines Revised July 8, 2016** (https://www.env.nm.gov/aqb/modeling/modelingpubs.html)

Vern Hershberger

From: Andrew Glen
Sent: Thursday, September 22, 2016 1:38 PM
To: Stonesifer, Jeff W.
Cc: Vern Hershberger; Brianna Hendrickson; Tavarez, Isreal L.; Eyerman, Regan V.
Subject: RE: Modeling Protocol for CTS Electronics

Jeff, after re-reviewing my email, I believe a sentence was cut short. Please see below for corrected discussion:

Hi Jeff,

Please see responses below for each of your questions, please let me know if you would like to discuss.

- Need to discuss receptor field close to CTS. Will it go right up to building?

The modeling protocol describes a variable receptor grid which will have a fine receptor grid with 50 meter grid spacing within 500 meters from the center-point of the modeling (354,915mE, 3,894,595 mN). In addition to this receptor grid we have placed a boundary receptor grid around the CTS building. This receptor grid has a 5 meter spacing between grid points and is located 1 m off each building wall at ground level. The figure below depicts all receptors in the immediate vicinity of the CTS facility. The yellow symbols are the fine grid receptors at 50 meter spacing. The blue outline is the model representation of buildings and the purple outline around the CTS building is the boundary receptor grid which follows the entire perimeter of the building. The boundary receptor grid is assumed to be the closest location a member of the public could legally get to the CTS building.

Figure 1. Wind Rose for 5-Year COA Airport 2001-2005 (left) and Wind Rose for Bernalillo 1997 (right).

- Could any sources be moved within the building?

Based on the model results we have established we do not believe any of the stacks need to be moved to a more centralized location on the roof.

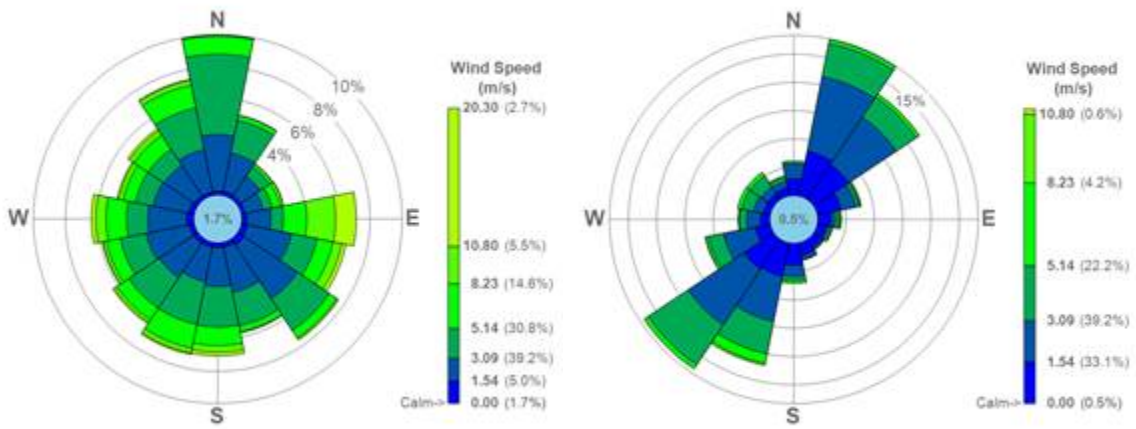
- Trinity needs to investigate State Toxics.

Trinity will review State Toxic requirements for applicability.

- Bernalillo met data may be more appropriate. This requires further examination and discussion with Andrew Glen of Trinity.

The meteorological data used in the modeling was the City of Albuquerque Airport 2001 – 2005 dataset (https://www.cabq.gov/airquality/download-air-data/dispersion-modeling-guidelines), the Bernalillo data set on the NMED website is a one year data set (1997) and is also from the meteorological station at the City of Albuquerque Airport (https://www.env.nm.gov/aqb/modeling/MeteorologyTable.htm). The surface ID in both data files is 23050, which is the ABQ airport. Therefore unless the CABQ has any additional Bernalillo data sets then the COA Airport 2001 – 2005 should be used as it is the most recent and is a five year data set.

Figure 2. Wind Rose for 5-Year COA Airport 2001-2005 (left) and Wind Rose for Bernalillo 1997 (right).



- Not sure that a PSD increment analysis is necessary. Is this a major source?

No the facility is not a PSD major source.

- Many important topics were not discussed in the protocol and could become issues during the modeling review.

The protocol was submitted to discuss the methodology Trinity proposes to use for modeling. The modeling report will contain significantly more information including data regarding the stack parameters, emission rates, operational hours and locations. Additional responses based on your modeling protocol checklist are attached.

Please let me know if you would like to discuss any of the points over the phone.

Cheers,

Andy

……

Andrew Glen, PhD
Senior Consultant
Ambient Monitoring Coordinator
Atmospheric Scientist

Office: **505-266-6611 x106**

From: Andrew Glen
Sent: Thursday, September 22, 2016 1:27 PM
To: 'Stonesifer, Jeff W.' <JStonesifer@cabq.gov>
Cc: Vern Hershberger <vhershberger@trinityconsultants.com>; Brianna Hendrickson <bhendrickson@trinityconsultants.com>; Tavarez, Isreal L. <ITavarez@cabq.gov>; Eyerman, Regan V. <reyerman@cabq.gov>
Subject: RE: Modeling Protocol for CTS Electronics

Hi Jeff,

Please see responses below for each of your questions, please let me know if you would like to discuss.

- Need to discuss receptor field close to CTS. Will it go right up to building?

The modeling protocol describes a variable receptor grid which will have a fine receptor grid with 50 meter grid spacing within 500 meters from the center-point of the modeling (354,915mE, 3,894,595 mN). In addition to this receptor grid we have placed a boundary receptor grid around the CTS building. This receptor grid has a 5 meter spacing between grid points and is located 1 m off each building wall at ground level. The figure below depicts all receptors in the immediate vicinity of the CTS facility. The yellow symbols are the fine grid receptors at 50 meter spacing. The blue outline is the model representation of buildings and the purple outline around the CTS building is the boundary receptor grid which follows the entire perimeter of the building. The boundary receptor grid is assumed to be the closest location a member of the public could legally get to the CTS building.

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Trinity will review State Toxic requirements for applicability.

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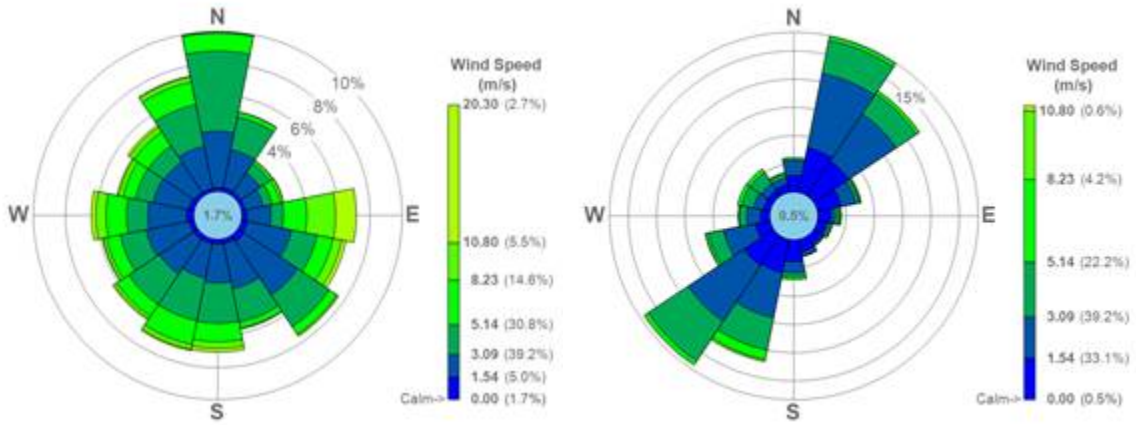

- Not sure that a PSD increment analysis is necessary. Is this a major source?

No the facility is not a PSD major source.

- Many important topics were not discussed in the protocol and could become issues during the modeling review.

The protocol was submitted to discuss the methodology Trinity proposes to use for modeling. The modeling report will contain significantly more information including data regarding the stack parameters, emission rates, operational hours and locations. Additional responses based on your modeling protocol checklist are attached.

Please let me know if you would like to discuss any of the points over the phone.

Cheers,

Andy

…….

Andrew Glen, PhD
Senior Consultant
Ambient Monitoring Coordinator
Atmospheric Scientist

Office: **505-266-6611 x106**

From: Stonesifer, Jeff W. [mailto:JStonesifer@cabq.gov]
Sent: Thursday, September 15, 2016 5:47 PM
To: Andrew Glen <aglen@trinityconsultants.com>
Cc: Vern Hershberger <vhershberger@trinityconsultants.com>; Brianna Hendrickson <bhendrickson@trinityconsultants.com>; Tavarez, Isreal L. <ITavarez@cabq.gov>; Eyerman, Regan V. <reyerman@cabq.gov>
Subject: RE: Modeling Protocol for CTS Electronics

Andy,

I have reviewed the protocol for CTS Electronics. My conclusions are as follows:

- Need to discuss receptor field close to CTS. Will it go right up to building?
- Could any sources be moved within the building?
- Trinity needs to investigate State Toxics.
- Bernalillo met data may be more appropriate. This requires further examination and discussion with Andrew Glen of Trinity.
- Not sure that a PSD increment analysis is necessary. Is this a major source?
- Many important topics were not discussed in the protocol and could become issues during the modeling review.

I have attached the full review to help you better understand the last bullet point.

Regards,

Jeff Stonesifer
City of Albuquerque Air Quality Program
Staff Meteorologist
(505)767-5624

From: Andrew Glen [mailto:aglen@trinityconsultants.com]
Sent: Wednesday, August 31, 2016 8:35 AM
To: Stonesifer, Jeff W.
Cc: Vern Hershberger; Brianna Hendrickson
Subject: Modeling Protocol for CTS Electronics

Hi Jeff,

As we discussed last week CTS is preparing an application for a permit modification. Please find attached a protocol for the modeling of the facility emissions for your review. We are aiming to submit the application in the upcoming week and would like to include your approval of the protocol in the application package if possible. Please let myself or Vern know if you have any questions or comments you would like addressed.

Cheers,

Andy

……

Andrew Glen, PhD
Senior Consultant
Ambient Monitoring Coordinator
Atmospheric Scientist

Trinity Consultants
9400 Holly Blvd NE, Building 3, Suite 300 | Albuquerque, New Mexico 87122

Office: **505-266-6611 x106** | Mobile: 307-760-6246
Email: aglen@trinityconsultants.com

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Learn about Trinity's courses for environmental professionals.

October 26, 2016

Air Dispersion Modeling Report

CTS Electronics

Facility Information

CTS Electronics is submitting an application to apply for a permit modification (pursuant to 20.11.41.29 NMAC) to its current air quality Authority to Construct Permit 217-M5. In this application, CTS Electronics proposed to modify their permit with the changes listed below.

- Updating dust collection controls
- Updating stack parameters

CTS Electronics seeks to demonstrate compliance with the New Mexico Ambient Air Quality Standards (NMAAQS) and National Ambient Air Quality Standards (NAAQS) for CO, NO_x, $PM_{2.5}$, PM_{10}, TSP, SO_2 and lead.

CTS Electronics manufactures ceramics for piezo-electronic components, SIC code 3679 and is located in Bernalillo County, New Mexico. The approximate UTM coordinates of the facility located in Zone 13 are 354,915 meters east and 3,894,595 meters north with WGS 84 datum at an elevation of approximately 5,127 feet above mean sea level. The stack parameters and emission rates included in the modeling are provided in Table 3 of Appendix A.

An aerial image of the facility and emission points can be seen in Figure 1.

Figure 1. Aerial image of CTS facility.

Proposed Modeling

Model Input Options

The latest version of the AERMOD dispersion model, v15181, was used for this analysis. The model was executed for all applicable averaging periods in Regulatory Default mode for CO, $PM_{2.5}$, PM_{10}, SO_2, lead, and TSP to determine the impacts. NO_x modeling was completed using Non-Regulatory Default mode to allow for the NMED approved use of ARM2 for conversion of NO_x to NO_2.

A building downwash analysis using the latest version of BPIP was conducted and incorporated into the modeling analysis to account for potential effluent downwash due to facility structures.

Receptor Grid Description and Elevation Data

The center point of the facility was designated at approximately 354,915 meters east and 3,894,595 meters north in Zone 13 and served as the center point for a variable receptor grid. A 50-meter grid spacing extended from the fence line to 500 meters from the facility boundary in each direction for a fine grid resolution. A 100-meter grid spacing extended from 500 meters to 1,000 meters in each direction for a medium grid resolution. A 250-meter grid spacing extended from 1,000 meters to 2,500 meters in each direction for a coarse grid resolution. A 500-meter grid spacing extended from 2,500 meters to 5,000 meters. A 1,000-meter grid spacing extended from 5,000 meters to 20,000 meters. A 1,500-meter grid spacing extended from 20,000 meters to 35,000 meters. A 2,000-meter grid spacing extended from 35,000 meters to 50,000 meters.

In addition, a 5-meter grid spacing was used to generate two facility boundary receptor arrays which surround the building. The first receptor array is in contact with the building walls and the second boundary receptor array is spaced approximately 1 m away from the building walls. Figure 2 depicts all receptors in the immediate vicinity of the CTS facility. The yellow symbols are the fine grid receptors at 50 meter spacing. The blue outline is the model representation of buildings and the purple outline around the CTS building is the boundary receptor grids which follow the entire perimeter of the building. The boundary receptor grids are assumed to be the closest location a member of the public could legally get to the CTS building.

The highest impacts from the proposed sources were located near the facility area.

The elevations of receptors, structures, and facility sources were determined using the most recent DEM data currently available.

Figure 2. Model setup of model receptors around the CTS facility and nearby buildings.

Meteorological Data

The modeling of CTS utilized the Bernalillo County one-year (1997) meteorological data set as requested by Jeff Stonesifer. This meteorological data set was downloaded from the New Mexico Environment Department website[1].

Significant Impact Analysis (SIL) and Cumulative Impact Analysis (CIA)

The modeled ground-level concentrations were compared to the corresponding significant impact levels (SILs) to determine whether any modeled ground-level concentrations at any receptor locations were greater than the SIL (i.e., "significant" receptors). The significance analysis revealed that modeled ground-level concentrations for annual TSP, 24-hr TSP, annual PM_{10}, 24-hr PM_{10}, annual $PM_{2.5}$, and 24-hr $PM_{2.5}$ were greater than the applicable SILs. Results from the significance analysis are shown in Table 1. Based on a phone conversation with Jeff Stonesifer on August 24, 2016, there are no surrounding sources which need to be included in CIA modeling, only background concentrations will be added. Jeff Stonesifer provided background concentrations for TSP, PM_{10} and $PM_{2.5}$ which can be seen with the results of the cumulative impact analyses Table 2.

[1] Source: https://www.env.nm.gov/aqb/modeling/MeteorologyTable.htm

PSD Class II Increment Analysis

Since the facility is not a major source, no PSD Class II Increment modeling was completed as discussed with Jeff Stonesifer on October 5, 2016.

Table 1. Significance Analysis.

Pollutant	Averaging Period	Significance Level µg/m³	Modeled µg/m³	Percent of Significance	Location of Maximum Concentration				
					X	Y	Elevation (m)	Distance (m)	ROI (m)
CO	8-hr	500	0.48	0.096%					
CO	1-hr	2000	1.05	0.052%					
NO_2	Annual	1	0.112	11.2%					
NO_2	24-hr	5	0.27	5.3%					
NO_2	1-hr	7.54	1.01	13.4%					
$PM_{2.5}$	Annual	0.3	4.2	Significant	354983.5	3894629	1561.42	Building Boundary	583.1
$PM_{2.5}$	24-hr	1.2	10.2	Significant	354983.5	3894629	1561.42	Building Boundary	640.3
PM_{10}	Annual	1	4.2	Significant	354982.5	3894630	1558.49	Building Boundary	212.1
PM_{10}	24-hr	5	10.7	Significant	354915	3894495	1557.82	Building Boundary	158.1
TSP	Annual	1	4.2	Significant	354982.5	3894630	1558.49	Building Boundary	212.1
TSP	24-hr	5	10.7	Significant	354915	3894495	1557.82	Building Boundary	158.1
SO_2	Annual	1	0.018	1.8%					
SO_2	24-hr	5	0.043	0.87%					
SO_2	3-hr	25	0.099	0.40%					
SO_2	1-hr	7.8	0.16	2.1%					
Lead	Month	0.03	0.001	3.2%					

Notes:

1. NO_X to NO_2 conversion methodology: ARM2

Table 2. Cumulative Impact Analysis.

Pollutant	Averaging Period	Standard, µg/m³		Modeled		Background	Calculated	Calculated as a Percent of the Standard		Background Monitor
		NAAQS	NMAAQS	Facility µg/m³	Facility & Neighbors µg/m³	µg/m³	µg/m³	NAAQS	NMAAQS	(If Applicable)
$PM_{2.5}$	Annual	**12**	-	4.2	4.2	6.2	10.4	86.8%	-	Del Norte (ID 350010023)
	24-hr	**35**	-	10.2	10.2	15.0	25.2	72.1%	-	Del Norte (ID 350010023)
PM_{10}	Annual	-	-	-	-	-	-	-	-	Jefferson (ID 350010026)
	24-hr	**150**	-	9.6	9.6	28.0	37.57721	25%	-	Jefferson (ID 350010026)
TSP	Annual	-	**60**	4.2	4.2	28.0	32.15178	-	54%	Jefferson (ID 350010026)
	24-hr	-	**150**	10.7	10.7	28.0	38.7453	-	26%	Jefferson (ID 350010026)

Notes:

1. Bolded standards are as provided in Table 6-A of the NMED Modeling Guidelines.
2. Non-bolded standards are calculated based on concentration conversion guidance in Section 2.5 of the NMED Modeling Guidelines.

APPENDIX A

Stack Parameters and Emission Rates

Table 3. Point Source Stack Parameters and Emission Rates.

Point Sources									Emission Rates						
ID	Description	X-Coordinate	Y-Coordinate	Elevation	Stack Height	Stack Temp	Stack Velocity	Stack Diameter	CO	NO_x	SO_2	Lead	$PM_{2.5}$	PM_{10}	TSP
		meters	meters	meters	Feet	F	ft/s	ft	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
DC_4	Dust collector for combined units: DC-1, SD-1, SD-2, SD-3, H1.2, H2.1, H3.2, H4.1, N-2, OV-1, DF3, H7.2, H7.3	354952.00	3894589.00	1557.98	42	110.53	65.21	2.26	1.4E-02	1.5E-02	2.2E-03	5.8E-06	0.0039	0.0039	0.0039
DC_2	Dust collector for combined units: DC-2	354951.00	3894549.00	1558.26	42	89.23	76.70	2.33	0.00	0.00	0.00	9.1E-05	0.189	0.189	0.189
FEU_1	Combined stack for units: UF-9, UF-5, UF-16, UF-15	354972.00	3894612.00	1558.29	42	83.13	33.93	2.61	0.00	0.00	0.00	1.8E-09	2.0E-05	2.0E-05	2.0E-05
N1	Main exhaust solvent stack	354936.00	3894508.00	1558.21	51	81.53	21.09	5.00	0.00	0.00	0.00	3.3E-05	0.049	0.049	0.049
DC_3	Dust collector for combined units: UF-26, UF-28, UF-27, UF-18, UF-24, OD-4, OD-3	354950.82	3894542.07	1558.31	42	81.53	77.00	2.33	0.00	0.00	0.00	1.1E-05	0.019	0.019	0.019
UF_1	Ultrafiltration Unit	354975.00	3894612.00	1558.36	42	93.03	30.09	2.58	0.00	0.00	0.00	1.9E-05	0.137	0.137	0.137
UF_2	Ultrafiltration Unit	354947.00	3894617.00	1557.65	42	80.03	14.62	2.61	0.00	0.00	0.00	1.5E-05	0.130	0.130	0.130
UF_3	Ultrafiltration Unit	354973.00	3894615.00	1558.30	42	89.93	22.08	2.68	0.00	0.00	0.00	3.0E-06	0.025	0.025	0.025