

JOHN BROWNING, P.E.  
7100 SW HAMPTON STREET  
COMMERCE PLAZA SUITE 235  
TIGARD, OR 97223  
TEL: (503) 212-2515  
FAX: (503) 675-1960  
jbrowning@bridgeh2o.com

JUN 30 2022

June 30, 2022

**Oregon Department of Environmental Quality  
Financial Services – Revenue Section**

Attn: Mr. George Yun  
700 NE Multnomah Street, Suite 600  
Portland, Oregon 97232 - 4100

**Delivered by Hand & email**

Subject: Type 3 Change Notice of Approval and Title V Permit Modification Application  
Owens-Brockway Glass Container Inc. – Permit No.: 26-1876

Dear Mr. Yun:

Owens-Brockway (Owens) operates a glass container manufacturing facility located at 9710 NE Glass Plant Rd., Portland, Oregon. Owens is proposing to add a catalytic ceramic filter (CCF) system to the Furnace D exhaust stack to control emissions of NO<sub>x</sub>, SO<sub>2</sub> and PM. On behalf of Owens, and in accordance with MAO<sup>1</sup> condition II.3.a.i, we are submitting today the enclosed administratively complete Notice of Approval application and permit modification application, including engineering specifications and vendor design, to install the CCF system on Furnace D.

We appreciated your attention to this matter and please don't hesitate to contact me at 503-412-9842 or via email at [jbrowning@bridgeh2o.com](mailto:jbrowning@bridgeh2o.com) if you have any questions.

Sincerely,



John Browning

cc: Melissa Hovey, DEQ  
Becka Puskas, DEQ  
Kieran O'Donnell, DEQ  
Matt Davis, DEQ  
Dennis Buenger, Owens-Brockway  
John Cayton, Owens-Brockway  
Geoff Tichenor, Stoel Rives LLP

<sup>1</sup> Mutual Agreement and Final Order, CASE NO. AQ/V-NWR-2020-208, signed October 22, 2021.

Page 2  
June 29, 2022

Encl.: Notice of Approval & Permit Modification Application (2 copies)  
Check in the amount of \$29,706.00 for:  
- Construction ACDP - \$14,400.00  
- Title V Moderate Permit Revision - \$15,306

**Type 3 Change Notice of Approval  
and Permit Modification Application**

**Owens-Brockway Glass Container Inc.  
Portland, Oregon**

Submitted to:

**Oregon Department of Environmental Quality**

June 30, 2022

**BRIDGEWATER GROUP, INC.**

# Contents

Attachment A – ODEQ Forms

Attachment B – Project Description

Attachment C – Control Device Manufacturer Information and Drawings

Attachment D – Static Dust Filter Manufacturer Information

Attachment E – Emission Calculations

Attachment F – Safety Data Sheets

# **Attachment A – ODEQ Forms**

### Administrative Information and Certification

Facility name: Owens-Brockway Glass Container Permit number: 26-1876-TV-01

|   |                              |                                     |
|---|------------------------------|-------------------------------------|
| 1. Site identifier:   |                              | Portland Plant                      |
| 2. Legal Name:  |                              | Owens-Brockway Glass Container Inc. |
| 3. Mailing Address:   | P.O. Box or Street number    | 9710 NE Glass Plant Rd.             |
|   | City, State, ZIP             | Portland, OR 97220                  |
| 4. Facility Address:  | Street number or description | 9710 NE Glass Plant Rd.             |
|   | City, County, ZIP            | Portland, Multnomah, 97220          |
|   | Tax lot #                    | 1N2E16D-02200 (Main Plant)          |
| 5. Owner:   | Name                         | Owens-Brockway Glass Container Inc. |
|   | Phone number                 | 567-336-3400                        |
| 6. Contact Person:  | Name                         | Jacob Wendler                       |
|   | Title                        | Plant Manager                       |
|   | Phone number                 | 503-351-8744                        |
|   | Email                        | Jacob.Wendler@O-I.com               |
|   | Fax number                   | see email                           |
| 7. Business activity and Industrial Classification Code(s): | Description                  | Glass container manufacturing       |
|   | Primary SIC and NAICS        | 3221/327213                         |
|   | Secondary SIC and NAICS      |                                     |
| 8. Other DEQ permits:                                       |                              | 1200-Z                              |

**Statement of Certification:**

I have reviewed this application and all supporting documentation in their entirety and to the best of my knowledge, information, and belief formed after reasonable inquiry, the statements and information contained herein are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment for knowing violations.

The status of this facility's compliance with all air pollution control applicable requirements is reported in this application along with the methods to be used for compliance demonstration. For applicable requirements with which this facility is in compliance, this facility will continue to comply with such requirements. For applicable requirements that will become effective during the permit term, this facility will meet such requirements on a timely basis. If there are any applicable requirements for which this facility is not in compliance, a schedule of compliance is included in this permit application describing how compliance will be achieved.

Jacob Wendler  
 \_\_\_\_\_  
**Name of Responsible Official**

Plant Manager  
 \_\_\_\_\_  
**Title of Responsible Official**

  
 \_\_\_\_\_  
**Signature of Responsible Official**

6/20/22  
 \_\_\_\_\_  
**Date**

**Fee Information**  
 (Make check payable to DEQ)

**Note: The initial application fees and annual fees specified below (OAR 340-216-8020, Table 2, Parts 1, 2 and 3) are only required for initial permit applications. These fees are not required for an application to renew or modify an existing permit. The appropriate specific activity fee(s) specified below (OAR 340-216-8020, Table 2, and Part 4) applies to permit modifications or may be in addition to initial permit application fees.**

| <b>OAR 340-216-8020, Table 2, Part 1 – Initial Permitting Application Fees:</b> |                                     |                     |
|---|-------------------------------------|---------------------|
| Short Term Activity ACDP  | <input type="checkbox"/>            | \$4,500.00          |
| Simple ACDP   | <input type="checkbox"/>            | \$9,000.00          |
| Construction ACDP   | <input checked="" type="checkbox"/> | \$14,400.00         |
| Standard ACDP   | <input type="checkbox"/>            | \$18,000.00         |
| Standard ACDP (Major NSR or Type A State NSR)                                   | <input type="checkbox"/>            | \$63,000.00         |
| <b>OAR 340-216-8020, Table 2, Part 2 – Annual Fees:</b>                         |                                     |                     |
| Simple ACDP – Low fee class   | <input type="checkbox"/>            | \$3,917.00          |
| Simple ACDP – High fee class  | <input type="checkbox"/>            | \$7,834.00          |
| Standard ACDP   | <input type="checkbox"/>            | \$15,759.00         |
| <b>OAR 340-216-8020, Table 2, Part 3 – Cleaner Air Oregon Annual Fees:</b>      |                                     |                     |
| Simple ACDP - Low fee class   | <input type="checkbox"/>            | \$806.00            |
| Simple ACDP - High fee class  | <input type="checkbox"/>            | \$1,612.00          |
| Standard ACDP   | <input type="checkbox"/>            | \$3,225.00          |
| <b>OAR 340-216-8020, Table 2, Part 4 – Specific Activity Fees:</b>              |                                     |                     |
| Non-Technical Permit Modification   | <input type="checkbox"/>            | \$432.00            |
| Basic Technical Permit Modification   | <input type="checkbox"/>            | \$540.00            |
| Simple Technical Permit Modification  | <input type="checkbox"/>            | \$1,800.00          |
| Moderate Technical Permit Modification  | <input type="checkbox"/>            | \$9,000.00          |
| Complex Technical Permit Modification   | <input type="checkbox"/>            | \$18,000.00         |
| Major NSR or type A State NSR Permit Modification                               | <input type="checkbox"/>            | \$63,000.00         |
| Modeling review (outside Major NSR or type A State NSR)                         | <input type="checkbox"/>            | \$9,000.00          |
| Public Hearing at Source's Request  | <input type="checkbox"/>            | \$3,600.00          |
| State MACT determination  | <input type="checkbox"/>            | \$9,000.00          |
| Compliance Order Monitoring   | <input type="checkbox"/>            | \$180.00/month      |
| <b>Total Fees:</b>  |                                     | <b>\$ 14,400.00</b> |

**1. Company Information:**

|  |  |
|--|--|
| Legal Name:<br>Owens-Brockway Glass Container Inc. | Other company name (if different than legal name): |
|--|--|

**2. Site Contact Person:**

(A person who deals with DEQ staff about equipment problems.)

|   |   |                   |
|---|---|-------------------|
| Name:<br>Jacob Wendler                      | Telephone number:<br>503-351-8744           | Fax:<br>see email |
| Title:<br>Plant Manager                     | Email address:<br>Jacob.Wendler@O-I.com     |                   |
| Mailing address:<br>9710 NE Glass Plant Rd. | City, State, Zip Code<br>Portland, OR 97220 |                   |

**3. Facility Contact Person:**

(If other than the site contact person, a person involved with all environmental issues at the facility although they may be housed at a different site.)

|                                  |                       |      |
|----------------------------------|-----------------------|------|
| Name:<br>See site contact person | Telephone number:     | Fax: |
| Title:                           | Email address:        |      |
| Mailing address:                 | City, State, Zip Code |      |

**4. Mailing Contact Person:**

(If other than the site contact person, a person to whom the company would like all agency communications directed.)

|                                  |                       |      |
|----------------------------------|-----------------------|------|
| Name:<br>See site contact person | Telephone number:     | Fax: |
| Title:                           | Email address:        |      |
| Mailing address:                 | City, State, Zip Code |      |

**5. Invoice Contact Person:**

(If other than the site contact person, a contact to which invoices and communications related to resolving invoice questions can be directed.)

|                                  |                       |      |
|----------------------------------|-----------------------|------|
| Name:<br>See site contact person | Telephone number:     | Fax: |
| Title:                           | Email address:        |      |
| Mailing address:                 | City, State, Zip Code |      |



**Submit TWO copies of the completed application to the appropriate address below.**

**New or Modified Permits (include fees)**

Oregon Department of Environmental Quality  
Financial Services – Revenue Section  
700 NE Multnomah St., Suite 600  
Portland, OR 97232-4100

**Permit Renewals (no fees)**

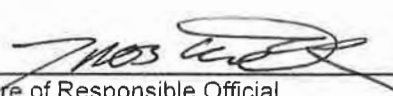
Oregon Department of Environmental Quality  
Northwest Region, Air Quality,  
700 NE Multnomah St., Suite 600  
Portland, OR 97232-4100

# Notice of Approval Application

| FOR DEQ USE ONLY |   |
|------------------|---|
| Permit Number:   | Regional Office: <b>NWR - AQ Permit Coordinator</b> |
| Application No:  | Check Number:                                       |
| Date Received:   | Amount (\$):  |
| Approved (date): | Staff Initials:                                     |

|   |   |
|---|---|
| 1. Source Number: 26-1876                       | Tax Lot #: 1N2E16D-02200 (Main Plant)               |
| 2. Company                                      | 3. Facility Location                                |
| Legal Name: Owens-Brockway Glass Container Inc. | Name: Owens-Brockway Glass Container Inc.           |
| Ownership type: Corporation                     | Plant start date: 1956                              |
| Mailing Address:<br>9710 NE Glass Plant Rd.     | Street Address:<br>9710 NE Glass Plant Rd.          |
| City, State, Zip Code:<br>Portland, OR 97220    | City, County, Zip Code:<br>Portland Multnomah 97220 |
| 4. Number of Employees (corporate): 20,360      | Number of Employees (plant site): 123               |

|                                      |  |
|--------------------------------------|--|
| 5. Contact Person                    | 6. Industrial Classification Code(s)       |
| Name: Jacob Wendler                  | SIC: 3221                                  |
| Title: Plant Manager                 | NAICS: 327213                              |
| Phone number: 503-351-8744           | 7. Type of construction/change*:<br>Type 3 |
| Fax number: see email                |  |
| Email address: Jacob.Wendler@O-I.com |  |

|   |   |
|---|---|
| <b>8. Signature</b>   |   |
| Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete. |   |
| Jacob Wendler<br>_____<br>Name of Responsible Official  | Plant Manager<br>_____<br>Title of Responsible Official |
| <br>_____<br>Signature of Responsible Official                                     | 6/20/22<br>_____<br>Date                                |

\*Note: This form requires a \$720 fee (OAR 340-216-8020 Table 2) for Type 2 Construction. For a description of Construction Types 1 through 4, see [OAR 340-210-0225](#).

**Construction information**

|     |  |   |
|-----|--|---|
| 9.  | <p>Will the construction or project establish a new or relocated emissions unit or point at the facility or location?</p> <p>If yes include or attach a plot plan, map, or other map-related image that clearly shows at least the following:</p> <ul style="list-style-type: none"> <li>• The physical location of the site and proposed construction or change;</li> <li>• The height of the proposed constructed or modified source and emissions point(s) and stack exit points;</li> <li>• A table or scale for distance;</li> <li>• The location of the nearest zoned residential property; and</li> <li>• The location of the nearest zoned commercial property.</li> </ul> <p style="text-align: right;"><b>See Attachment B: Figure B-2</b></p> | <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> |
| 10. | <p>Will the construction allow for an increase in production or capacity of the facility?</p> <p>If yes, by how much (include appropriate units or appropriate clarifying details; attach additional pages as necessary):</p>  | <p>Yes <input type="checkbox"/></p> <p>No <input checked="" type="checkbox"/></p> |
| 11. | <p>Will the construction result in:</p> <ul style="list-style-type: none"> <li>• An increase or decrease any regulated pollutant emissions; or</li> <li>• Cause any new regulated pollutants to be emitted that were not emitted previously?</li> </ul> <p>If yes, use the pre and post-construction 'Emissions Data' table below for each regulated pollutant change (increase or decrease) and each new pollutant.<br/>See OAR <a href="#">340-200-0020(134)</a> for a description of regulated pollutants [For the purposes of this form, regulated air pollutant includes Toxic Air Contaminants]</p> <p style="text-align: right;"><b>See Attachment E: Emission Calculations</b></p>   | <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> |
| 12. | <p>Are there any requirements applicable to the new construction or modification?</p> <p>If yes, list them by rule citation (attach additional pages as necessary):</p> <p>The project includes adding a control device to glass manufacturing Furnace D. The primary applicable requirement is NSPS Subpart CC provided in 40 CFR 60.292 (a 0.2 lb/ton PM limit).</p>   | <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> |

**Fill out one of the following (13a or 13b) as appropriate:**

13.a **New and unpermitted facilities:** Describe any existing facility or operations on site and the proposed construction.  
N/A

13.b **Existing permitted facilities:** Describe the proposed construction or modification and describe the changes to existing processes or activities. N/A

See Attachment B - Project Description

14. Provide a brief description of the production process **and** attach or include a detailed process flow chart or diagram clearly showing new/existing emissions units and any changes to the process flow expected after the construction or modification: N/A

See Attachment B - Project Description including Figure B-1 - Process Flow Diagram and Emissions Schematic.

|  |   |  |
|--|---|--|
| 15.  | If the construction/project increases the size (i.e., physical footprint) of the facility/operations, a <a href="#">LUCS</a> specific to the change(s) is required (unless the construction is exclusively for the installation of pollution control equipment). All new facilities or additional properties being used require an approved LUCS.<br><br>If this change requires land use approval, have you attached or included an approved LUCS? | Yes <input type="checkbox"/><br>No <input type="checkbox"/><br>N/A <input checked="" type="checkbox"/> |
| 16.  | If the construction involves any new emission unit(s) or changes to existing emission unit(s), series DV200 and EU500 forms are required. **<br><br>Have you attached or included all necessary DV200 and EU500 forms?  | Yes <input checked="" type="checkbox"/><br>No <input type="checkbox"/><br>N/A <input type="checkbox"/> |
| 17.  | If the construction includes pollution control equipment, series CD300 form(s), manufacturer information, and/or equipment specifications are required.<br><br>Have you attached or included all necessary CD300 forms and relevant supplemental material?  | Yes <input checked="" type="checkbox"/><br>No <input type="checkbox"/><br>N/A <input type="checkbox"/> |
| 18.  | Will the construction or project result in any increase or new fuels being used on site?<br><br>If yes, list the types and approximate quantities expected to be used:<br>The project includes a natural gas fired duct burner. See Attachment E.   | Yes <input checked="" type="checkbox"/><br>No <input type="checkbox"/>                                 |
| 19.  | Will the construction or project result in any new or additional refuse generation?<br>If yes:<br>What are the approximate types and amounts?<br>See Attachments B & E regarding the solids handling system.<br><br>What will be the method of disposal?<br>Onsite reuse, offsite reuse, or other offsite management.   | Yes <input checked="" type="checkbox"/><br>No <input type="checkbox"/>                                 |
| If the proposed construction or project has any association with underground storage tanks (or the associated piping), it is the applicant's responsibility to contact the UST program to determine any additional applicable requirements.<br>UST Email: <a href="mailto:tanks.info@deq.oregon.gov">tanks.info@deq.oregon.gov</a> UST Phone: 503-229-6652 or 800-742-7878 |   |  |

**Timing of construction:**

|     |  |                          |
|-----|--|--------------------------|
| 20. | Date on which contracts are signed, equipment is ordered, or the facility/entity has or will otherwise 'commit' to initiating construction activities  | (mm/dd/yyyy)<br>per MAO* |
| 21. | Anticipated date of the beginning of physical construction (e.g. breaking ground)  | per MAO*                 |
| 22. | Anticipated date of construction completion. Unless otherwise specified, the responsible official must submit the <a href="#">R1004 form</a> within 30 days after completing the construction or modification. | per MAO*                 |

23. Include or otherwise attach any information on pollution prevention measures or cross-media impacts you want DEQ to consider in determining applicable control requirements and evaluating compliance methods.

\*Mutual Agreement and Final Order, CASE NO. AQ/V-NWR-2020-208, signed October 22, 2021.

\*\*New emission units associated with the new pollution control equipment include a sorbent storage silo and solids handling equipment. Emissions are minor and can be included as aggregate insignificant activities.





Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

|    |   |                                      |
|----|---|--------------------------------------|
| 1. | Device name and ID number or label                                | EU-11aia: Sorbent Silo               |
| 2. | Date installation/construction commenced                          | per MAO                              |
| 3. | Date installed  | per MAO                              |
| 4. | Special control requirements? [ if yes, describe]                 | No                                   |
| 5. | Description of process:<br><b>See Attachment B</b>                |                                      |
| 6. | Continuous or batch process? [if batch, maximum batches per hour] | <b>Batch loading, continuous use</b> |

7. Raw material usage: [for EACH raw material used, enter]:

| Material                | Maximum design capacity (lbs/batch or lbs/hr) |
|-------------------------|---|
| <b>See Attachment E</b> |   |
|                         |   |
|                         |   |
|                         |   |

8. Production data: [for EACH product, enter]:

| Product                 | Maximum design capacity (lbs/batch or lbs/hr) |
|-------------------------|---|
| <b>See Attachment E</b> |   |
|                         |   |
|                         |   |
|                         |   |

9. Attach any additional information necessary to describe this process and its operating and usage parameters, both short-term and annual.

**See Attachment E**



Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

|    |   |                           |
|----|---|---------------------------|
| 1. | Device name and ID number or label                                | EU-12aia: Solids Handling |
| 2. | Date installation/construction commenced                          | per MAO                   |
| 3. | Date installed  | per MAO                   |
| 4. | Special control requirements? [ if yes, describe]                 | No                        |
| 5. | Description of process:<br><b>See Attachment B</b>                |                           |
| 6. | Continuous or batch process? [if batch, maximum batches per hour] | <b>continuous</b>         |

7. Raw material usage: [for EACH raw material used, enter]:

| Material                | Maximum design capacity (lbs/batch or lbs/hr) |
|-------------------------|---|
| <b>See Attachment E</b> |   |
|                         |   |
|                         |   |
|                         |   |

8. Production data: [for EACH product, enter]:

| Product                 | Maximum design capacity (lbs/batch or lbs/hr) |
|-------------------------|---|
| <b>See Attachment E</b> |   |
|                         |   |
|                         |   |
|                         |   |

9. Attach any additional information necessary to describe this process and its operating and usage parameters, both short-term and annual.

**See Attachment E**



State of Oregon  
Department of  
Environmental  
Quality

Pollution Control Device Form  
Other Pollution Control Devices

**FORM CD306**  
**Answer Sheet**

Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

|    |   |   |
|----|---|---|
| 1. | Name  | Silo Static Filter  |
| 2. | ID number or label  | SS02  |
| 3. | Date installed  | per MAO   |
| 4. | Manufacturer  | NOL-TEC or equivalent   |
| 5. | Model number  | 238 or equivalent   |
| 6. | Type of device (describe)<br>Static filter. See Attachment D for more information |   |
| 7. | Rated efficiency (%)  | 99%+ per EPA Air Pollution Control Technology Fact Sheet (APA-452/F-03-004) |
| 8. | Design inlet gas flow rate (acfm)   | NA  |





State of Oregon  
Department of  
Environmental  
Quality

Pollution Control Device Form  
Other Pollution Control Devices

**FORM CD306**  
**Answer Sheet**

Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

|    |                                   |   |
|----|-----------------------------------|---|
| 1. | Name                              | Silo Static Filter  |
| 2. | ID number or label                | BB03, WH04, and DB05  |
| 3. | Date installed                    | per MAO   |
| 4. | Manufacturer                      | NOL-TEC or equivalent   |
| 5. | Model number                      | 279 or equivalent   |
| 6. | Type of device (describe)         | Static filter. See Attachment D for more information                        |
| 7. | Rated efficiency (%)              | 99%+ per EPA Air Pollution Control Technology Fact Sheet (APA-452/F-03-004) |
| 8. | Design inlet gas flow rate (acfm) | NA  |



Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

|     |   |                          |  |  |  |
|-----|---|--------------------------|--|--|--|
| 1.  | Name  | CCF System               |  |  |  |
| 2.  | ID number or label                              | CCF01                    |  |  |  |
| 3.  | Date installed                                  | per MAO                  |  |  |  |
| 4.  | Manufacturer                                    | TriMer (or equivalent)   |  |  |  |
| 5.  | Model number                                    | Ultracat (or equivalent) |  |  |  |
| 6.  | Rated efficiency (%)                            | =>95                     |  |  |  |
| 7.  | Cleaning mechanism                              | air pulse                |  |  |  |
| 8.  | Cleaning frequency                              | based on dP              |  |  |  |
| 9.  | Design inlet gas flow rate (acfm)               | 26,365                   |  |  |  |
| 10. | Design air-to-cloth ratio                       | 2.0-2.7                  |  |  |  |
| 11. | Number of bags                                  | 510                      |  |  |  |
| 12. | Design pressure drop (inches of water column) * | 1-20                     |  |  |  |

\*Pressure drop ranges for the CCF system are preliminary. Owens anticipates determining appropriate operating parameters during initial operation and source testing.



## Requested annual plant site emission limits

Form ED605A

### Emissions Unit Summary:

| EU ID | Pollutant | Annual Emissions (tons/yr) |
|-------|-----------|----------------------------|
|       |           |                            |
|       |           |                            |
|       |           |                            |
|       |           |                            |
|       |           |                            |
|       |           |                            |
|       |           |                            |
|       |           |                            |

### Facility Summary:

| Pollutant | Annual Emissions (tons/yr) |
|-----------|----------------------------|
| PM        |                            |
| PM10      |                            |
| PM2.5     |                            |
| SO2       |                            |
| NOx       |                            |
| CO        |                            |
| VOC       |                            |
| GHG       |                            |

**See Attachment E - Emission Calculations**



**Stack Testing**

Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

1. Testing Information:

| Emissions Unit ID | Pollutant     | Standard(s) or Emission Factors | Test Method | Frequency | Program     |
|-------------------|---------------|---------------------------------|-------------|-----------|-------------|
| EU-4              | PM/PM10/PM2.5 | 0.2 lb/ton filt. PM             | EPA 5       | TBD       | NSPS        |
| EU-4              | PM/PM10/PM2.5 | 0.10 gr/dscf                    | EPA 5/202   | TBD       | OAR 340-226 |
|                   |               |                                 |             |           |             |
|                   |               |                                 |             |           |             |
|                   |               |                                 |             |           |             |
|                   |               |                                 |             |           |             |
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|                   |               |                                 |             |           |             |
|                   |               |                                 |             |           |             |
|                   |               |                                 |             |           |             |

2. Source Sampling Plans:

- a. A source sampling plan is required to be submitted to DEQ for review and approval at least 15 days prior to each test (allow more time for more complicated tests).
- b. For new sources, initial performance testing is generally required within 60 days of achieving the maximum operating rate, but not later than 180 days after startup.





| DEQ USE ONLY  |  |
|---|--|
| Permit Number:                                      | Type of Application:                                   |
| Application No:                                     | RNW ___ MOD ___ NEW ___                                |
| Date Received:                                      |  |
| Regional Office: <b>NWR - AQ Permit Coordinator</b> | Check No. <span style="float: right;">Amount \$</span> |

| 1. Company  | 2. Facility Location   |
|---|--|
| Legal Name:<br><b>Owens-Brockway Glass Container Inc.</b>   | Name:<br><b>Owens-Brockway Glass Container Inc.</b>  |
| Mailing Address:<br><b>9710 NE Glass Plant Rd.</b>  | Street Address:<br><b>9710 NE Glass Plant Rd.</b>  |
| City: <b>Portland</b> State: <b>OR</b> Zip Code: <b>97220</b>   | City: <b>Portland</b> County: <b>Multnomah</b> Zip Code: <b>97220</b>  |
| Number of employees (Corporate): <b>20,360</b>  | Number of employees (Facility): <b>123</b>   |
| 3. Industrial Classification Code(s)  | 4. Other DEQ Permits   |
| Primary SIC and NAICS: <b>3221/327213</b>   | <b>1200-Z</b>  |
| Secondary SIC and NAICS:  | <b>5. LUCS:</b> <input type="checkbox"/> New facility <input type="checkbox"/> Modified facility <b>NA</b><br>Tax Lot #: |
| 6. Permit Action:   |  |
| <input type="checkbox"/> Short Term Activity ACDP<br><input type="checkbox"/> New Simple ACDP with short-term NAAQS analysis<br><input type="checkbox"/> New Construction ACDP with short-term NAAQS analysis<br><input type="checkbox"/> New Standard ACDP with short-term NAAQS analysis<br><input type="checkbox"/> New or modified Standard ACDP (PSD/NSR) with short-term NAAQS analysis<br><input type="checkbox"/> Renewal of an existing permit without changes (include form AQ403 for Standard ACDPs)<br><input type="checkbox"/> Renewal of an existing permit with changes (include any other necessary forms and form AQ403 for Standard ACDPs)<br><input checked="" type="checkbox"/> Modification of existing permit |  |
| 7. Signature  |  |
| I hereby apply for permission to discharge air contaminants in the State of Oregon, as stated or described in this application, and certify that the information contained in this application and the schedules and exhibits appended hereto, are true and correct to the best of my knowledge and belief.   |  |
| <b>Jacob Wendler</b>  | <b>Plant Manager (503-351-8744)</b>  |
| Name of official (Printed or Typed)   | Title of official and phone number   |
|    | <b>6/20/22</b>   |
| Signature of official   | Date   |





**Significant Permit Modification Application**

**FORM MD906  
Answer Sheet**

Facility name: Owens-Brockway Glass Container Inc. Permit Number: 26-1876-TV-01

Part A

|    |  |  |                       |
|----|--|--|-----------------------|
| 1. | Contact Person:  | Name   | Jacob Wendler         |
|    |  | Title  | Plant Manager         |
|    |  | Phone number   | 503-351-8744          |
|    |  | email address  | Jacob.Wendler@O-I.com |
|    |  | Fax number   | see email             |
| 2. | Describe the change:<br>Adding air pollution control device to Furnace D. See Attachment B for additional details. |  |                       |
| 3. | Date change will take effect:  | ~Q3 2023   |                       |
| 4. | Applicable requirements (describe and attach appropriate forms)  | The primary applicable requirement, per the MAO, is NSPS Subpart CC provided in 40 CFR 60.292 (a 0.2 lb/ton PM limit). |                       |
| 5. | Change in emissions  | Yes, decrease  |                       |
| 6. | Does the change involve construction of any new stationary sources or modifications to existing stationary sources | The change involves adding a control device.   |                       |
| 7. | Construction permit incorporation [yes/no]   | see note below   |                       |
|    | Type of construction/modification change   |  |                       |
|    | If Type 3 or 4 change, enhanced permitting procedures used [yes/no]  |  |                       |
|    | Construction, purpose [describe]   |  |                       |
|    | Changes in operating conditions [describe]   |  |                       |

It is anticipated that the installation of a control device on Furnace D will be treated as a Type 3 change and DEQ will issue a Construction ACDP, the requirements of which can be incorporated into the facility's modified Title V permit.

**Significant Permit Modification Application**

8. Attached Form Series EU500, DV200, CD300, and CP700, as appropriate

**Statement of Certification:**

*Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete.*

**Jacob Wendler**

Name of Responsible Official

**Plant Manager**

Title of Responsible Official

  
Signature of Responsible Official

6/20/22  
Date

**Part B**

| Pollutant        | Emissions increase or decrease (tons/yr) | PSEL (tons/yr) |              |
|------------------|--|----------------|--------------|
|                  |  | Before change  | After change |
| See Attachment E |  |                |              |
|                  |  |                |              |
|                  |  |                |              |
|                  |  |                |              |
|                  |  |                |              |
|                  |  |                |              |
|                  |  |                |              |

Attach form ED605.

# **Attachment B – Project Description**

### Overview – Furnace D Air Pollution Control Device Project

Owens-Brockway (Owens) operates a glass container manufacturing facility located at 9710 NE Glass Plant Rd., Portland, Oregon. Owens is proposing to add a catalytic ceramic filter (CCF) system to the Furnace D exhaust stack to control emissions of PM, as well as NO<sub>x</sub> and SO<sub>2</sub>.

The CCF systems are high temperature, light-weight ceramic filters impregnated with a NO<sub>x</sub> catalyst (vanadium pentoxide) as the primary method of treating exhaust gas. Aqueous ammonia (aqua ammonia) will be injected upstream and interact with the catalyst-embedded filters to convert a high percentage of the NO<sub>x</sub> emissions to nitrogen gas and water vapor, with very low ammonia slip. Hydrated lime (sorbent) will be injected upstream of the filters to control SO<sub>2</sub>. The filters also remove PM and heavy metals that exist as oxides with the help of sorbent. Separate screws will transport process solids removed from each system for potential reuse in the glass making process, or transfer to bulk bags for off-site reuse or disposal.

### Process and Emissions Information

Figure B-1 provides a Process Flow Diagram and Emissions Schematic for the Furnace D control device project. The following narrative describes each major component of the control device system and describes potential air emissions of regulated air pollutants. The project necessitates the definition of two new emission units as shown on Figure B-1: EU-11aia – Sorbent Silo and EU-12aia – Solids Handling. Emissions from both of these units are negligible and they can be included as aggregate insignificant activities (AIA).

Detailed emission calculations are provided in Attachment E. Tables E-1 through E-5 provide detailed emission calculations for the Furnace D air pollution control device project. Table E-6 provides detailed emission calculations for existing sources along with the Furnace D air pollution control device project emissions. Table E-7 provides a plant wide emissions summary of criteria pollutant and greenhouse gas emissions. The facility remains a minor source of hazardous air pollutants (HAPs).

Proposed control device manufacturer information and drawings are provided in Attachment C.

### Duct Burner

Flue gas from the existing Furnace D (EU4-GM4) stack will be routed to the new control device. A direct-fired inline duct burner will be present but will only be used during low flow/temperature conditions which occur infrequently. During low flow/temperature conditions the duct burner can be used to heat the exhaust stream to required temperatures. The duct burner is natural gas-fired and has a maximum rated capacity of 7.5 MMBtu/hr. The duct burner will be a source of natural gas combustion byproduct emissions (criteria pollutants, trace amounts of toxic air contaminants and greenhouse gases). Emission calculations for the duct burner are provided in Attachment E.

### Ammonia Injection

19% aqua ammonia stored in a tank will be injected into the ductwork with the use of atomizing air to obtain the required control for NO<sub>x</sub>. The rate is controlled by measuring the inlet mass rate of NO<sub>x</sub>. Ammonia slip is expected to be less than 10 ppmv.

The aqua ammonia will be stored on-site in a pressurized 10,000-gallon storage tank. The vertical tank is approximately 9 feet in diameter and 25 feet tall. The tank is pressurized and sealed, and there will be no routine emissions of ammonia from the tank (i.e., working and breathing losses). A safety data sheet for aqua ammonia is provided in Attachment F.

### Sorbent Injection

Dry sorbent (i.e., hydrated lime, Sorbacal<sup>®</sup>, or similar) will also be injected in the ductwork to control for SO<sub>2</sub>. The sorbent inject rate will be up to 155 lb/hr.

The dry sorbent will be stored in a new 2,250 cubic foot storage silo. During silo filling or product transfer displaced air within the silo will be a source of particulate matter emissions and the silo will have a side-entry dust collector controlled with static cartridge filters (emission point SS02 on Figure B-1; Nol-Tec, Model 238 or equivalent, see Attachment D). Emission calculations for the storage silo are provided in Attachment E. A safety data sheet of a potential sorbent type is provided in Attachment F.

### CCF System

The combined exhaust gas containing the required levels of dry sorbent and aqua ammonia flows to the inlet plenum of the CCF system. The retention within the duct provides vaporization of aqua ammonia, mixing of sorbent and ammonia gas with the process gas, and the first step of the gas reaction with the dry sorbent. The furnace exhaust is then routed to the filter housing array, divided equally between the housings, and flows through the ceramic filter elements within each housing. The PM is removed, the SO<sub>2</sub> gas is more fully reacted by the sorbent cake that forms on the filters, and the NO<sub>x</sub> and ammonia are converted to nitrogen and water vapor by contact with the catalyst contained within the filter element walls.

The ceramic catalytic filters are capable of reducing filterable PM emissions by at least 95 percent and stack emissions can comply with the following limits that apply to Furnace D: 0.10 gr/dscf Total PM limit; 20% opacity limit; and the applicable NSPS subpart CC Filterable PM limit, 40 CFR 60.292 (0.1 g/kg or 0.2 lb/ton).

The clean gas exits each of the filter housings, is combined to a single stream in the outlet plenum of the system, and then is pulled through the fan and discharged to the stack (emission point CCF01 on Figure B-1). Process solids generated by the system are collected from each filter housing and transferred from the hopper of each filter housing into a common collection auger.

Emission calculations for Furnace D controlled by the CCF system are provided in Attachment E.

## Solids Handling

Process solids generated from the CCF are delivered to a common collection auger (enclosed screw conveyor). At the collection auger discharge, a diverter valve will be used to convey material to either a bulk bagging station, or transported by a pressure vessel to an existing silo located in the Batch House for reuse of the solids in the glass bottle manufacturing process. New project equipment associated with the solids handling includes bulk bagging, a weigh hopper and day bin (emission points BB03, WH04, and DB05 respectively as shown in Figure B-1). These systems will have static dust filters to control particulate emissions (Nol-Tec, Model 279 or equivalent, see Attachment D). Emission calculations for solids handling are provided in Attachment E.

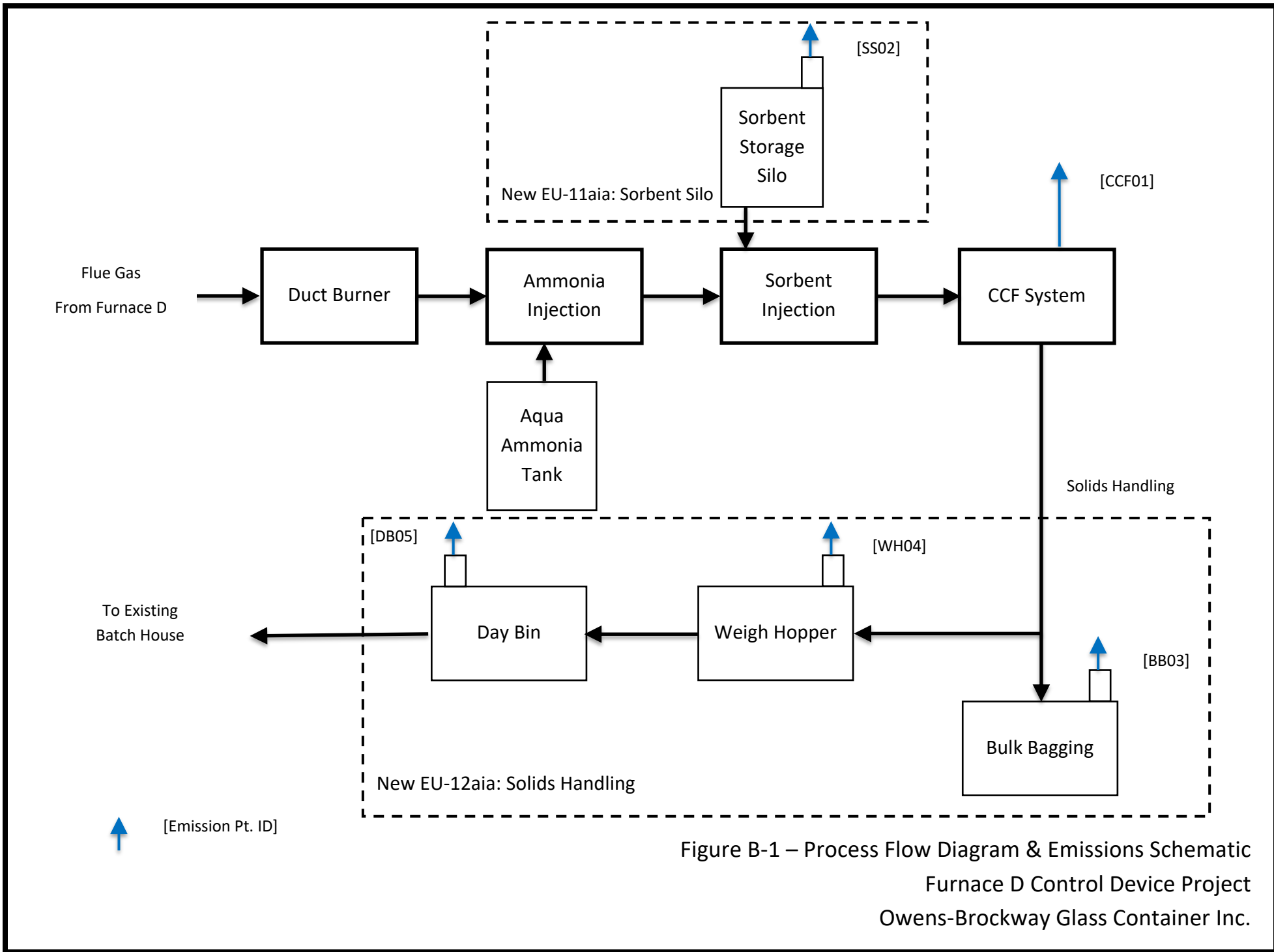


Figure B-1 – Process Flow Diagram & Emissions Schematic  
 Furnace D Control Device Project  
 Owens-Brockway Glass Container Inc.

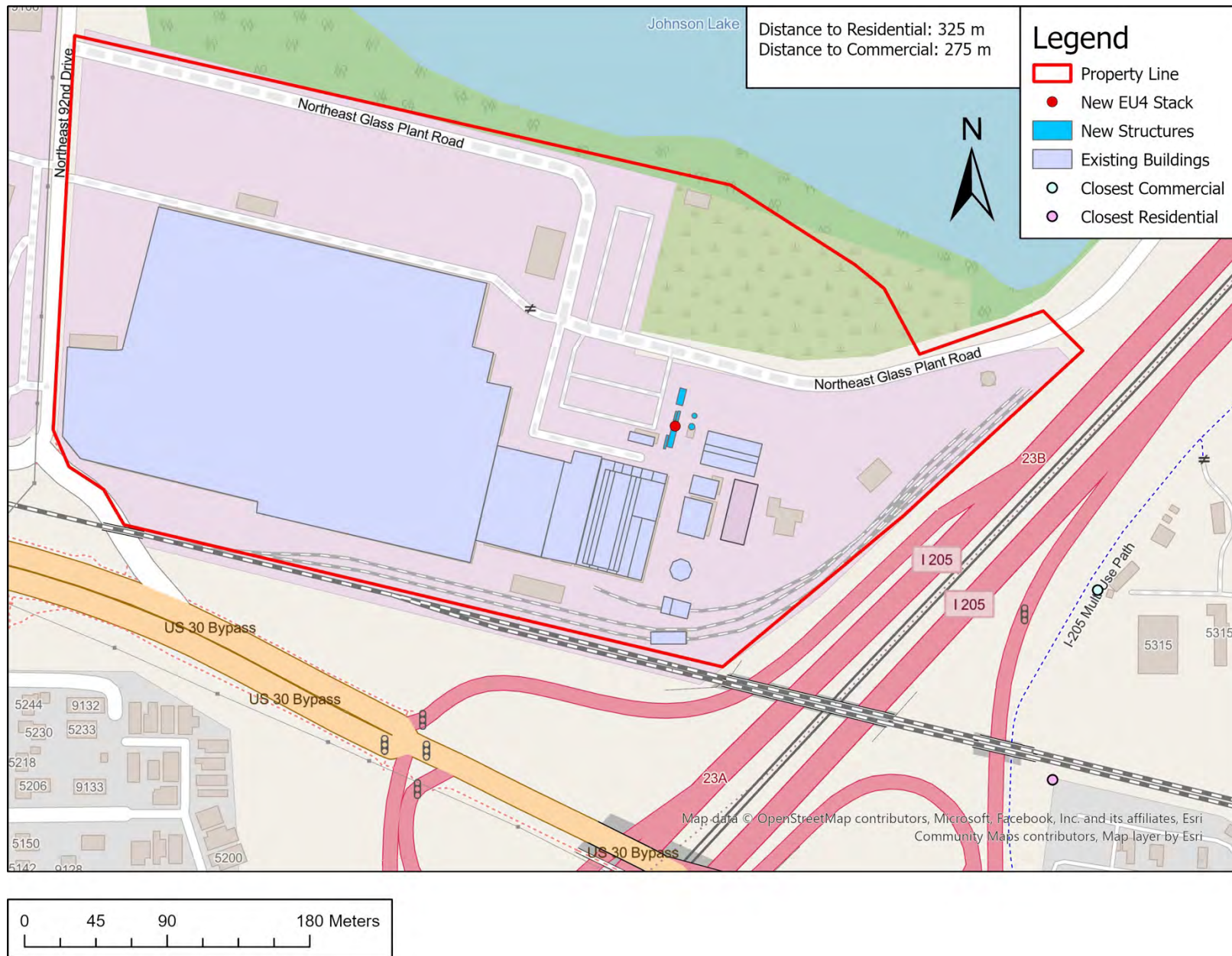


Figure B-2 – Plot Plan and Map  
Furnace D Control Device Project  
Owens-Brockway Glass Container Inc.



# **Attachment C – APCD Manufacturer Information & Drawings**

Note: At the time of this submittal the selection and procurement of the air pollution control device manufacturer and equipment has not been finalized. Related information is subject to change but equipment pollution control performance is planned to be as represented in this application.

# *UltraCat* Catalytic Filter Systems



Particulate • NOx • SOx • HCl • VOC • O-HAP • Hg • D/F • CO



*Tri-Mer has installed more Catalytic Ceramic Filter Systems than all other suppliers combined, **worldwide.***

# Tri-Mer Corporation is the World's Largest Supplier of Ceramic Catalyst Filter Systems

## All-in-One Solution

Tri-Mer UltraCat Catalytic Filter Systems are state-of-the-art for removing particulate (PM), SO<sub>2</sub>, HCl, mercury and heavy metals. Simultaneously, the ceramic catalyst filters destroy NO<sub>x</sub>, cement organic HAPs, and dioxins. Systems can be configured for any combination of the pollutants.

The system is completely dry, with no water consumption. Disposal of the dry collected waste is straightforward. Large gas flow volumes can be accommodated.

**PM • SO<sub>x</sub> • NO<sub>x</sub> • VOC • Dioxins • HCL • Hg • CO**

*Boiler MACT • CISWI MACT • Lime MACT 2*

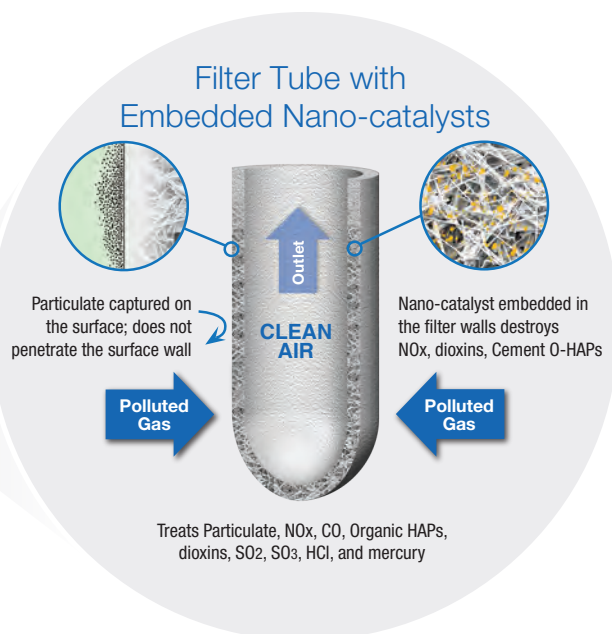
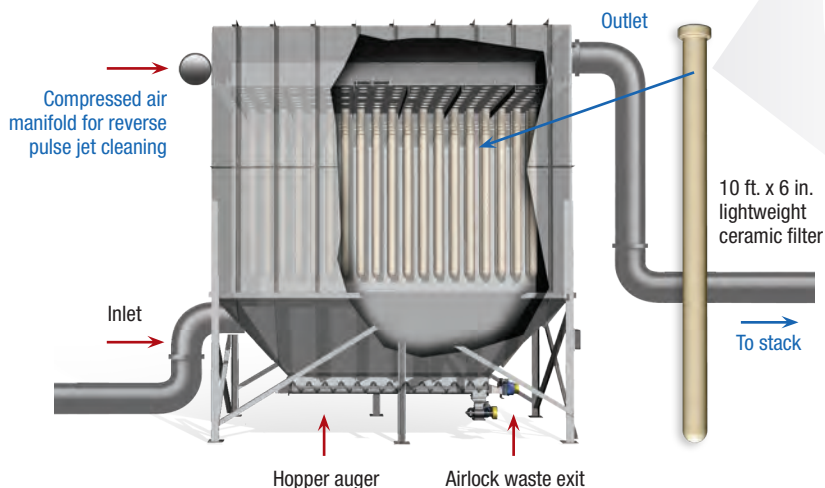
*HWC MACT • Cement NESHAP • Title V Compliance*

*CARB Diesel Regs • EPA Glass Regs • EPA Ceramics Regs*



## System Architecture

Ceramic filter tube wall is 3/4" thick with catalyst embedded throughout the wall. Filters are self-supporting without filter cages, and have a service life of 5 to 10 years.



Catalyst is inside the filter walls, protected from PM blinding and poisoning.

## Particulate Control

Tri-Mer's UltraCat Filter System removes particulate from gas sources above 300°F, including PM10, PM2.5, and submicron. Typical outlet levels are less than 0.001 grains / dscf (2.0 mg/Nm<sup>3</sup>) regardless of inlet loading. Heavier loadings require more frequent pulse-jet cleaning of the filters but outlet levels remain the same.

## NOx Control

UltraCat Catalytic filter tubes have nanobits of SCR catalyst embedded in the filter walls. Operating range is 350°F to 950°F. The large reactive surface area of the micronized catalyst produces high NOx removal at temperatures lower than standard SCR. Good results start at 350°F and improve to 95% removal at 450°F and above.

The unique structure of the filters captures process particulate on its outer surface, keeping it away from the nano-catalyst inside the filter walls. This prevents PM blinding and poisoning of the catalyst, and greatly extends the catalyst life compared to standard SCR.

## Cement O-HAPs, Dioxin, VOCs

The VOCs designated as organic HAPs in cement regulations are destroyed by the embedded catalyst. Good removal on the primary Cement O-HAPs occurs at temperatures over 400°F, with excellent results on all Cement O-HAPs approaching 500°F. Other VOCs are also selectively destroyed. Dioxins are eliminated by the filters, typically with 95% efficiency or higher.

## SO<sub>2</sub>, SO<sub>3</sub>, HCl, HF Removal Using Dry Sorbent Injection

Systems have an option for dry sorbent injection of calcium or sodium-based sorbents (hydrated lime, sodium bicarbonate and trona) to remove SO<sub>2</sub>, SO<sub>3</sub>, HCl and HF.

Powdered sorbents are injected upstream of the filters and the reaction by-products captured as particulate at the filters. The SO<sub>2</sub> removal reaction occurs within the duct leading to the filters and at the sorbent cake that accumulates on the surface of the filters. The chemical reaction of the sorbent with the acid gas creates a solid particle that is captured on the filters, along with the unreacted sorbent and the process particulate.

With dry sorbent injection, SO<sub>2</sub> removal is typically 90-95%, with removal efficiencies as high as 97%. HCl removal is typically 95%, and often as high as 99%. The temperature range for effective removal is 300°F to 1600°F.

## Mercury Control

The system removes mercury using injection of dry sorbents. Powder activated carbon and other sorbents, some pre-blended with the acid gas sorbents, are selected on a case-by-case basis. Mercury control is a key feature.

## CO Removal

Tri-Mer systems can be configured to remove Carbon Monoxide, simultaneously with other pollutants, at temperatures of 450°F and above.

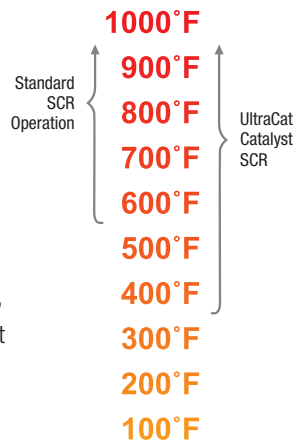


# A Revolution in NOx Control

- Very high removal efficiency, greater than 90%
- Greater than 90% removal at 400°F.
- Extended catalyst life because the micronized catalyst is embedded within the body of the filter and protected from blinding and poisoning.

The combination of these factors has revolutionized NOx removal, especially for applications that have temperature limitations and/or require the simultaneous removal of other pollutants.

At even lower temperatures, 350°F, the UCF system will remove NOx at approximately 70% efficiency. In addition to NOx, catalytic filters will remove PM, Cement O-HAPs and dioxins, and can be configured to remove CO, SO2, HCl, and HF. Regulatory authorities have recognized the Tri-Mer UCF system to be a major advance in NOx and multi-pollutant control technology.



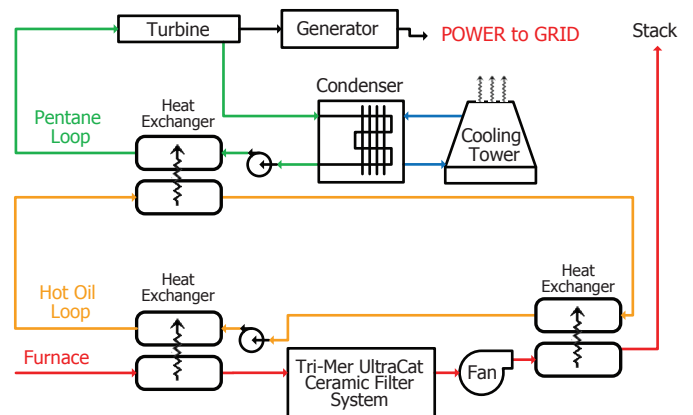
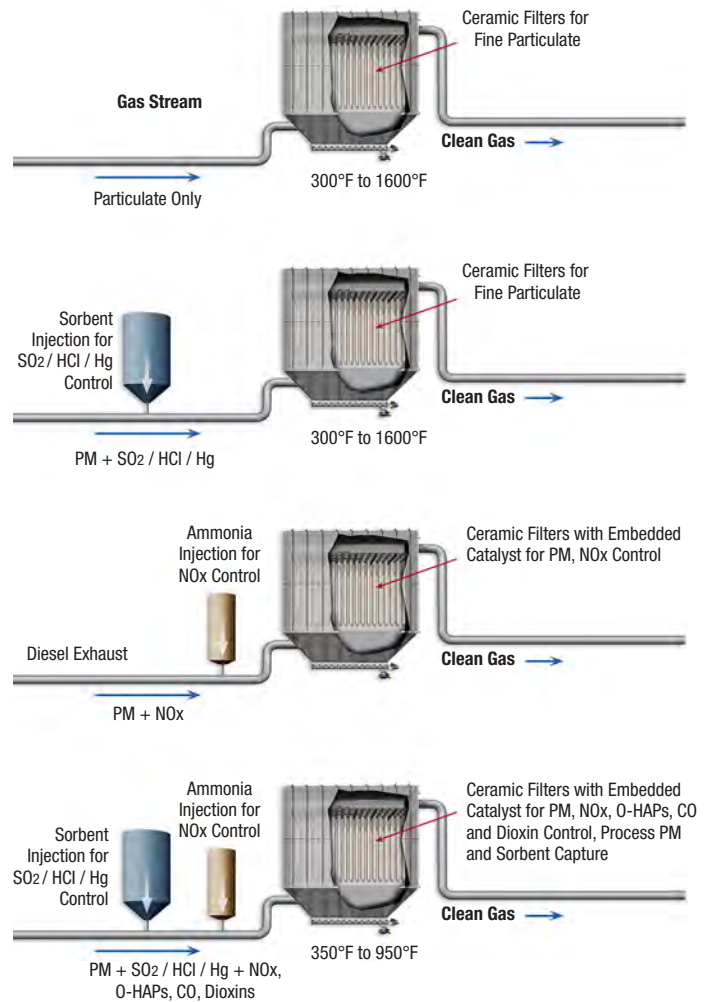
# UltraCat Catalytic Filter and Power Generation Systems

Tri-Mer UltraCat filter systems are ideal for maximizing the energy that can be extracted from furnace exhaust for use in an Organic Rankine Cycle (ORC) power generation loop. The heat is transferred to a hot oil intermediate loop, and then to an ORC loop (see figure below right).

Conventional technologies such as ESP and SCR have narrow hot operating ranges, and sizable heat loss across their combination. In contrast, the UCF is equally effective for pollutant removal over a very wide temperature range, including cooler temperatures (see NOx figure above), with a very low heat loss. The high tie-in temperature at the upstream heat exchanger, combined with a much lower exit temperature to the UCF system creates a greater ΔT. This increases thermodynamic efficiency. After the UCF cleans the gas, a second downstream stage of heat removal is incorporated.

The UCF flexibility allows continued control of emissions in the event the power generation loop goes offline for maintenance, making the UCF system the ideal pollution control technology to pair with heat recovery.

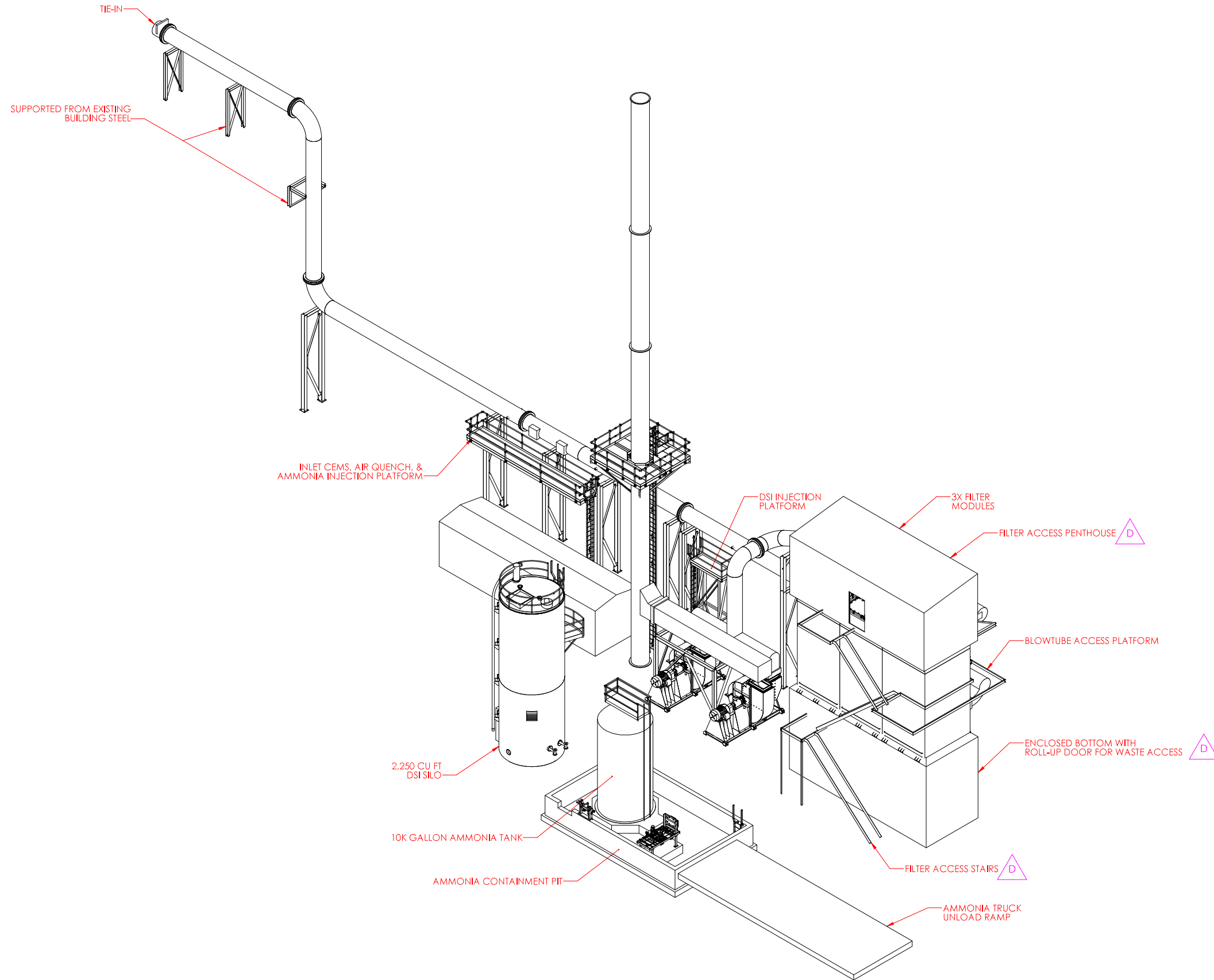
# Several Versions of One Highly Effective System



The Tri-Mer System presents the optimal combination for pollution control performance and electrical power generation.



Technology Leader  
air pollution control

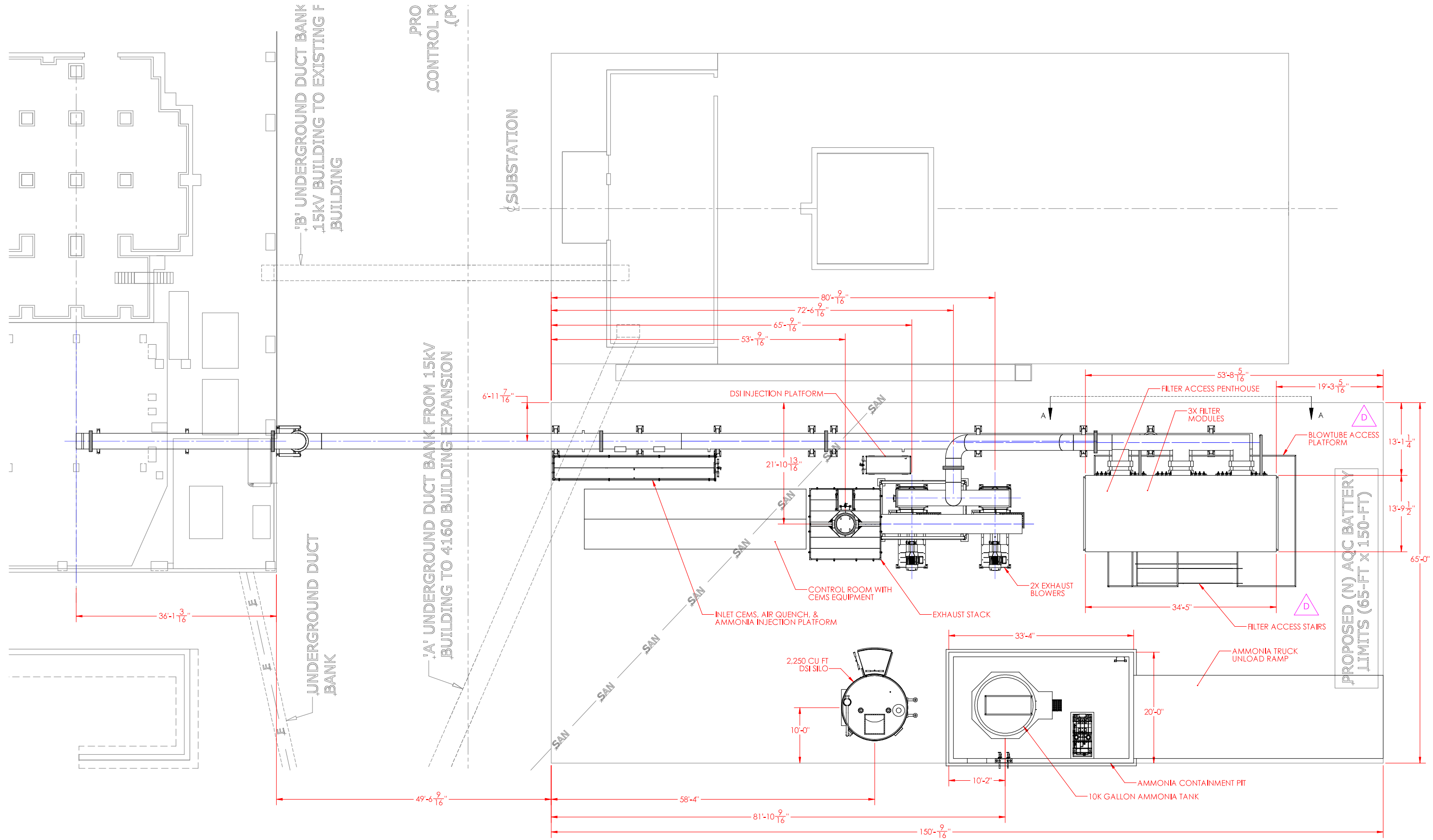


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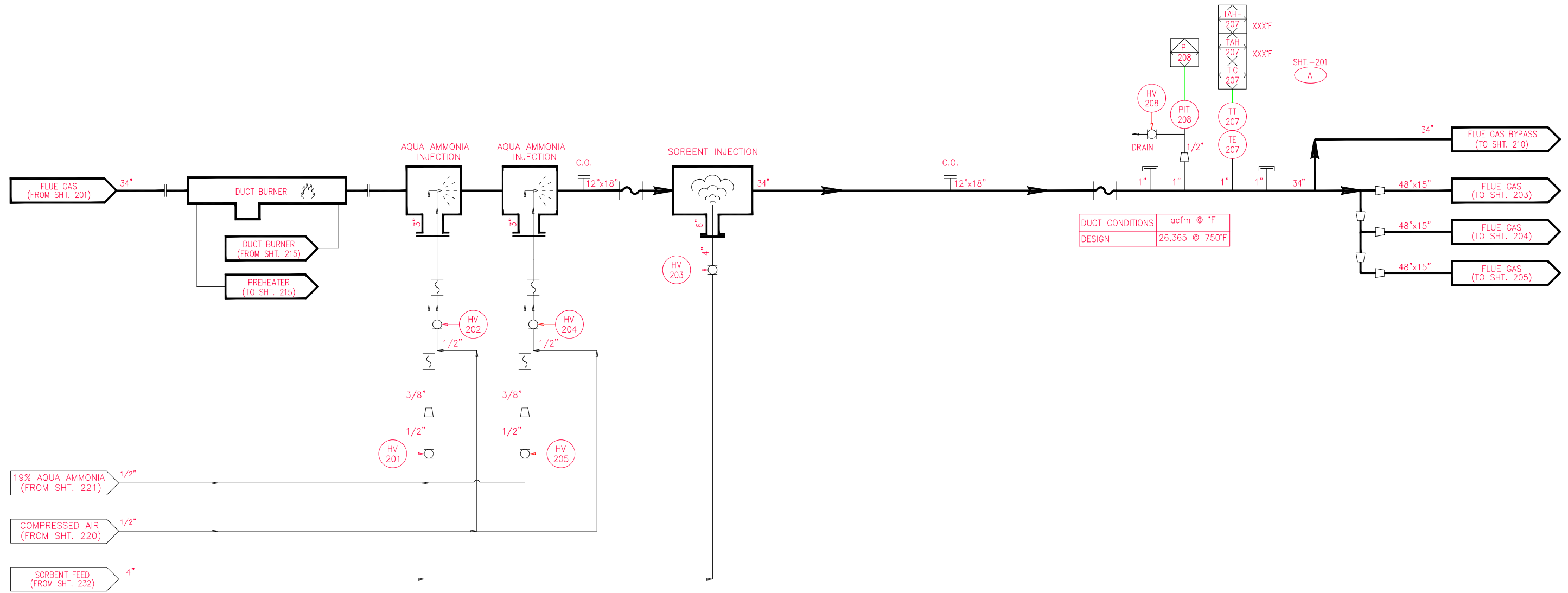
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SIZE D  
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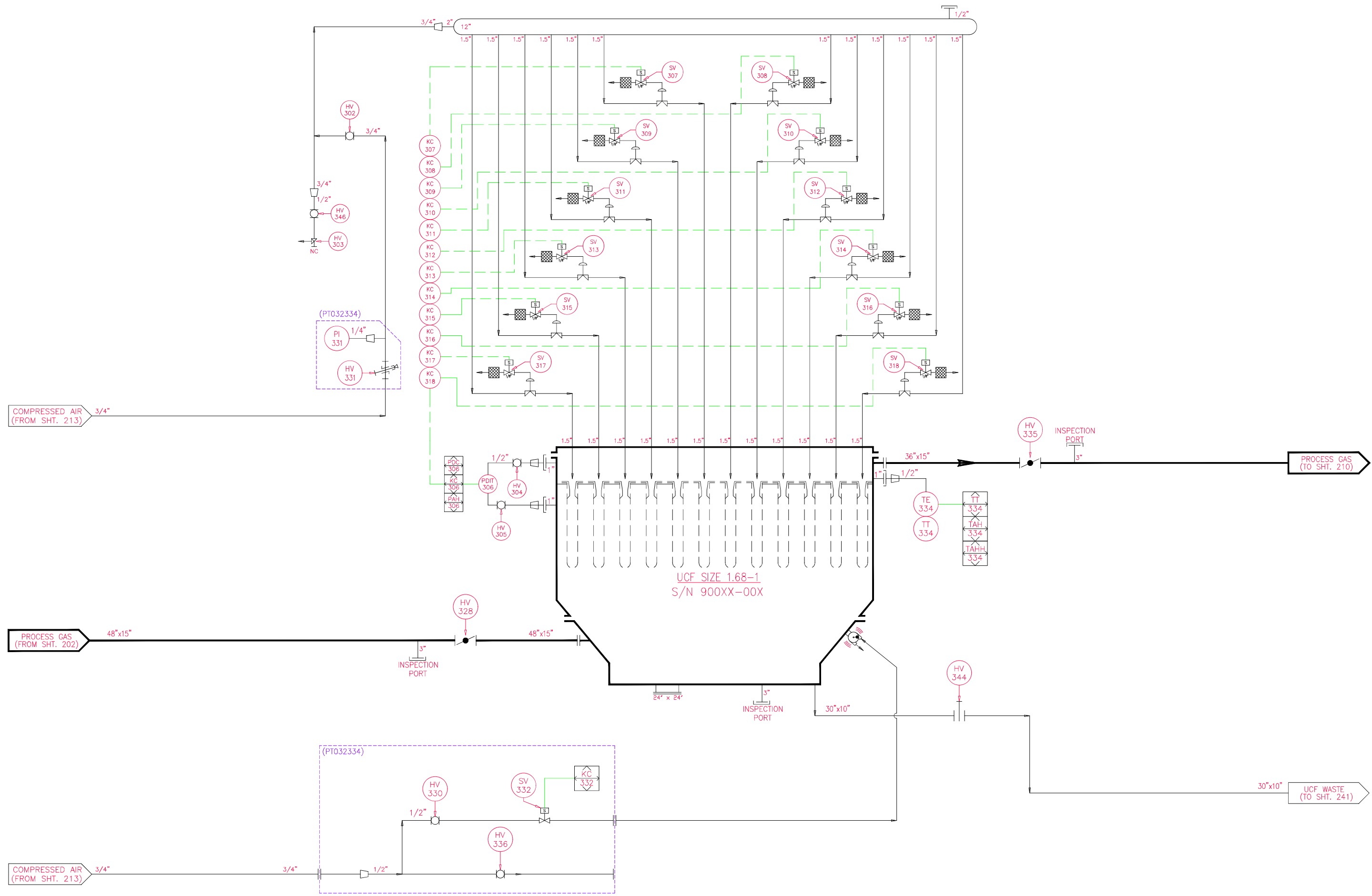


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| REVISION 2 | — |
| REVISION 1 | — |

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 Ames, IA 50002  
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 Fax: 515-771-7777  
 Web: www.tri-mer.com  
 E-Mail: engrgdp@tri-mer.com

|            |                                     |
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| DATE       | 05/17/22                            |
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| SHT. NO.   | 202                                 |
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| DWN. BY    | C.E.                                |
| APVD. BY   |                                     |



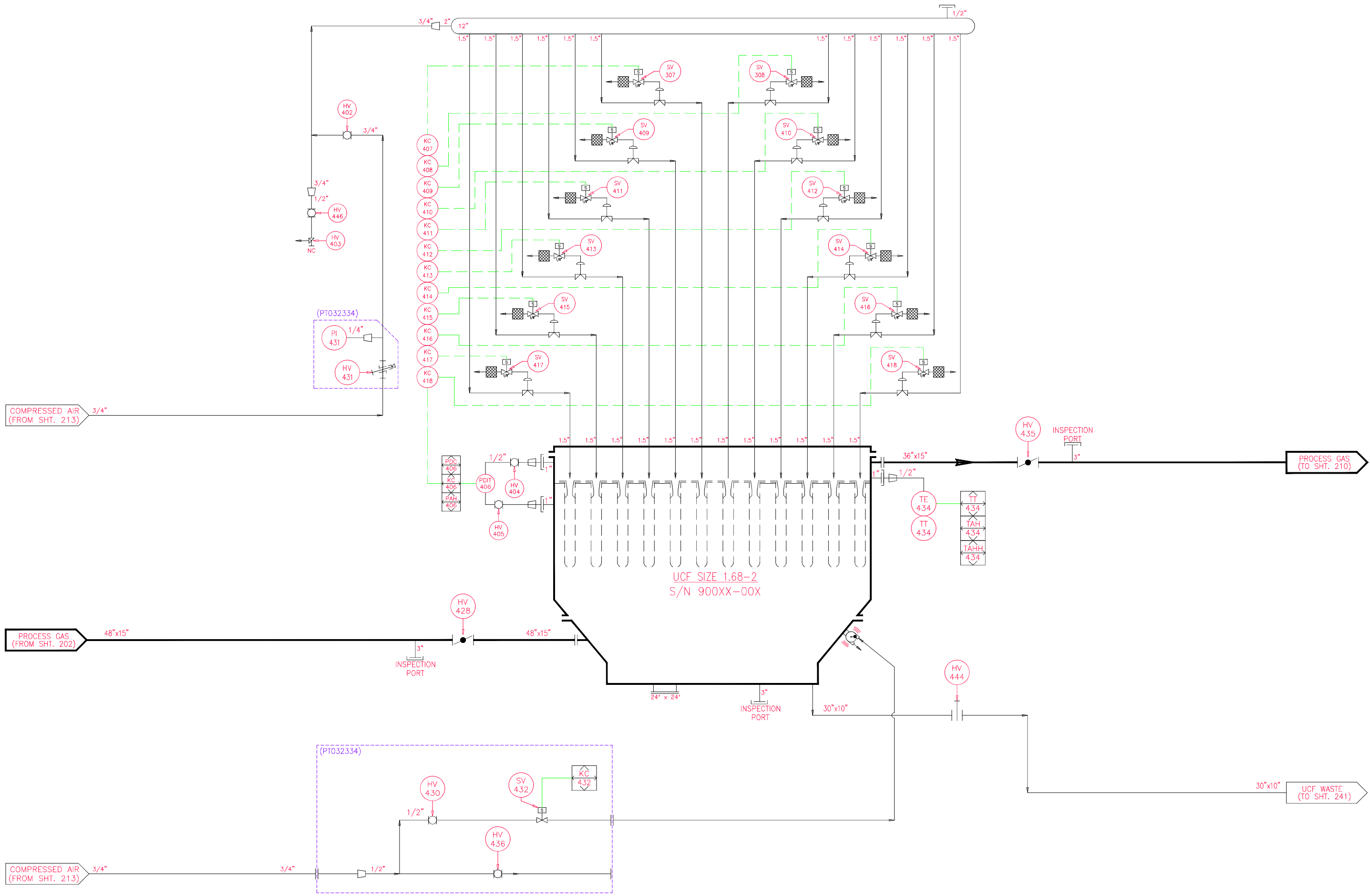
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 Tel: 715-771-7777 Fax: 715-771-7844  
 Web: www.tri-mer.com E-Mail: engrg@tri-mer.com

|            |                              |
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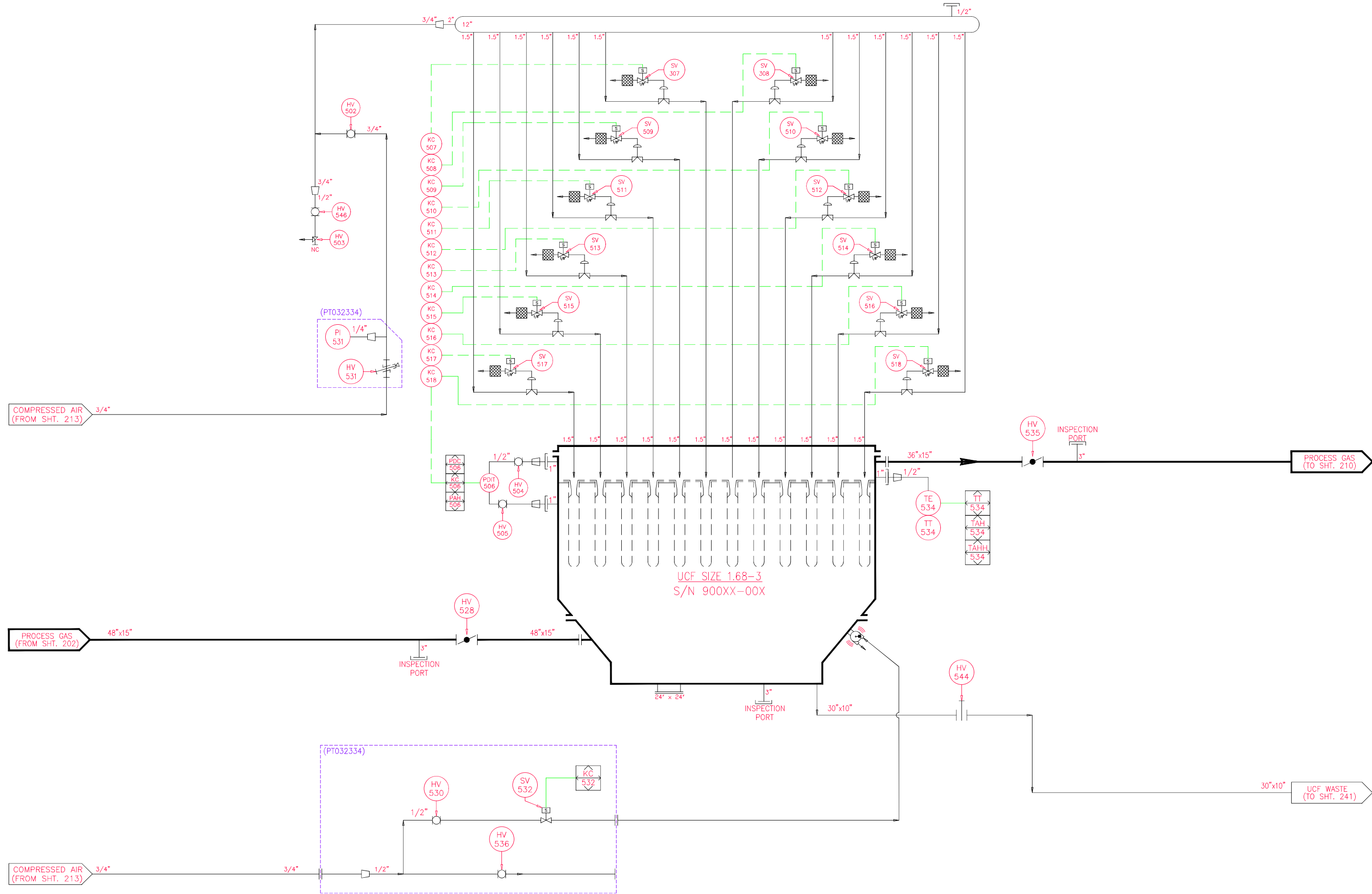
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 Tel: 920-777-7777 Fax: 920-723-7844  
 Web: www.tri-mer.com E-Mail: engrgdp@tri-mer.com

|            |                              |
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| DATE       | 05/17/22                     |
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J P23.309-204



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 E-Mail: engrgdp@tri-mer.com

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| DWG. TITLE | P&ID: UCF SIZE 1.68-3        |
| CUSTOMER   | O-1 CORPORATION PORTLAND, OR |
| DWG. NO.   | 205                          |
| SCALE      | FULL                         |
| DATE       | 05/17/22                     |
| DWG. LIST  | J P23.309-205                |

J P23.309-205

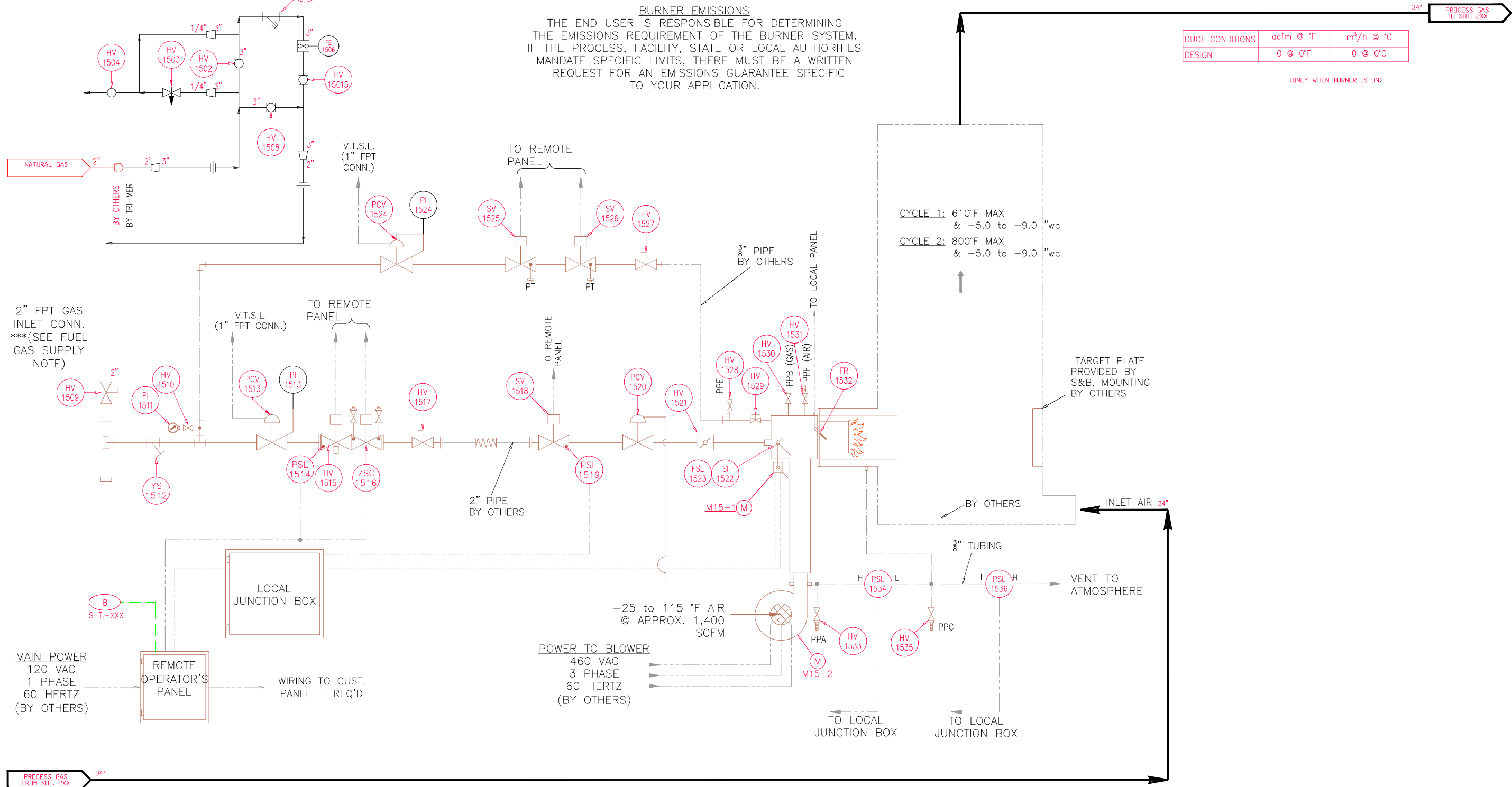
7,000 SCFH N. GAS @ 11 PSI. END USER IS RESPONSIBLE FOR SUPPLYING PROPER GAS PRESSURE INTO UNIT. BELOW 8 PSI THE BURNER WILL NOT DELIVER RATING. PRESSURE GREATER THAN 15 PSI MAY CAUSE DAMAGE TO THE COMPONENTS.

- NOTES:**
- 1) V.T.S.L. = VENT TO SAFE LOCATION (BY OTHERS) SEE INSTALLATION SECTION OF MANUAL
  - 2) REFERENCE DWG. -02 BOM FOR BILL OF MATERIALS
  - 3) REFERENCE JOB DATA FOR SPECIFIC DESIGN & SET UP INFO

**BURNER EMISSIONS**  
THE END USER IS RESPONSIBLE FOR DETERMINING THE EMISSIONS REQUIREMENT OF THE BURNER SYSTEM. IF THE PROCESS, FACILITY, STATE OR LOCAL AUTHORITIES MANDATE SPECIFIC LIMITS, THERE MUST BE A WRITTEN REQUEST FOR AN EMISSIONS GUARANTEE SPECIFIC TO YOUR APPLICATION.

| DUCT CONDITIONS | acfm @ °F | m <sup>3</sup> /h @ °C |
|-----------------|-----------|------------------------|
| DESIGN          | 0 @ 0°F   | 0 @ 0°C                |

(ONLY WHEN BURNER IS ON)



**MAIN POWER**  
120 VAC  
1 PHASE  
60 HERTZ  
(BY OTHERS)

**REMOTE OPERATOR'S PANEL**  
WIRING TO CUST. PANEL IF REQ'D

**POWER TO BLOWER**  
460 VAC  
3 PHASE  
60 HERTZ  
(BY OTHERS)

-25 to 115 °F AIR  
@ APPROX. 1,400 SCFM

**LEGEND**

- INDICATES FACTORY PIPING OR DUCTWORK
- INDICATES FACTORY WIRING
- INDICATES SHIELDED CABLE (FIELD WIRING BY OTHERS)
- INDICATES INTERCONNECTING WIRE OR ITEMS BY OTHERS
- INDICATES TUBING (1/2" O.D. STAINLESS STEEL UNLESS OTHERWISE NOTED)

- REVISION 6
- REVISION 5
- REVISION 4
- REVISION 3
- REVISION 2
- REVISION 1

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P.O. Box 771, Dept. J, 8867  
Web: www.tri-mer.com  
E-Mail: engrg@tri-mer.com

DWG. TITLE: P&ID: DUCT BURNER  
SCALE: FULL  
DATE: 05/17/22  
SHT. NO.: 215  
DWG. NO.: J P23.309-215

CUSTOMER: O-I CORPORATION  
PORTLAND, OR  
SCALE: FULL  
DATE: 05/17/22

DWG. NO.: J P23.309-215

DWG. NO.: J P23.309-215

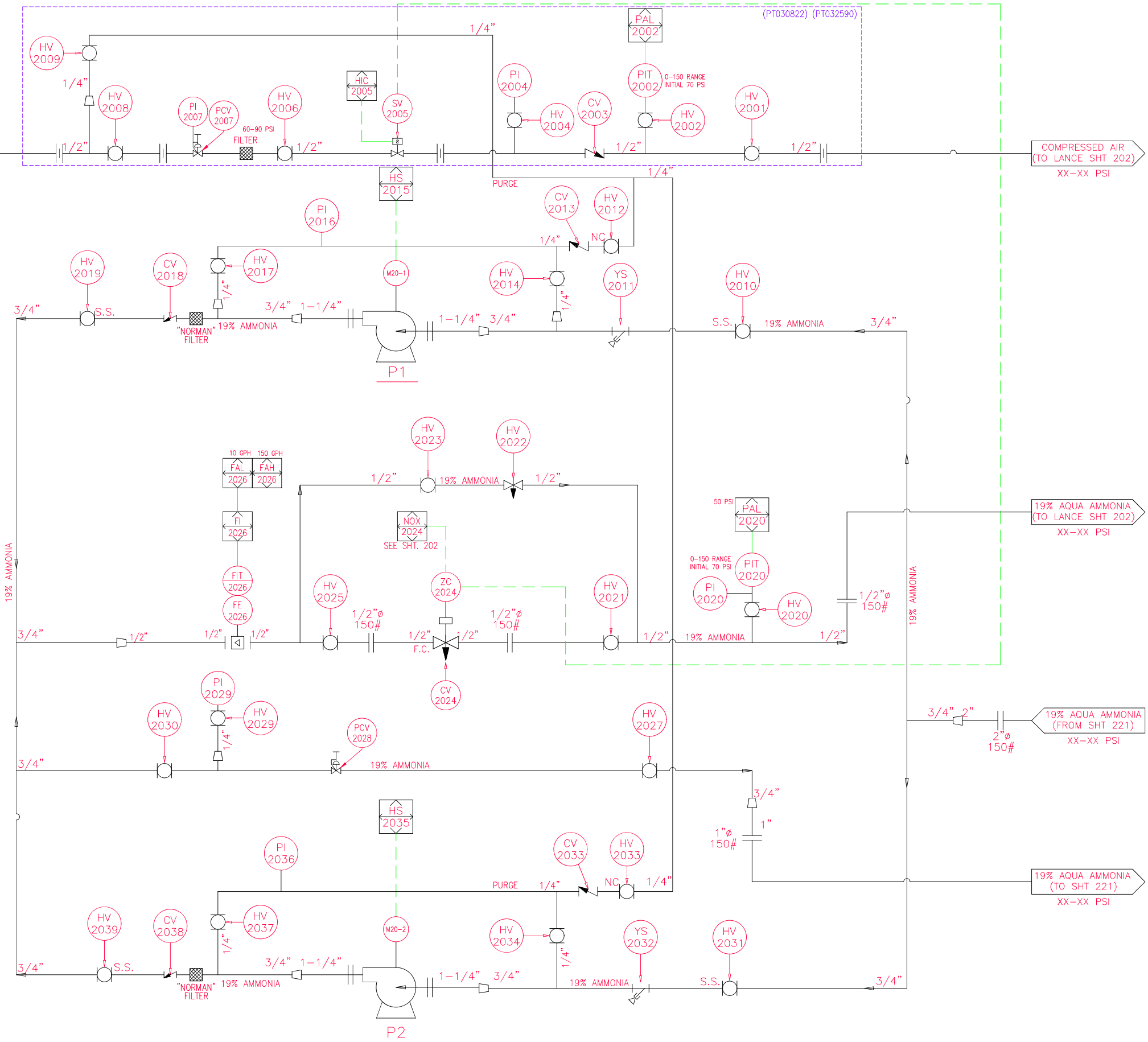
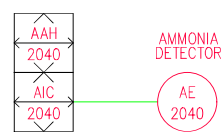
AMMONIA RACK & PUMP SKID (SIGNALS ARE WIRED TO LOCAL J-BOX)

(PT030598) (PT032589)

(PT030822) (PT032590)

COMPRESSED AIR  
(FROM SHT. 213)  
XX-XX PSI

COMPRESSED AIR  
(TO LANCE SHT 202)  
XX-XX PSI



P#:(PT030598)

|            |     |
|------------|-----|
| REVISION 6 | --- |
| REVISION 5 | --- |
| REVISION 4 | --- |
| REVISION 3 | --- |
| REVISION 2 | --- |
| REVISION 1 | --- |

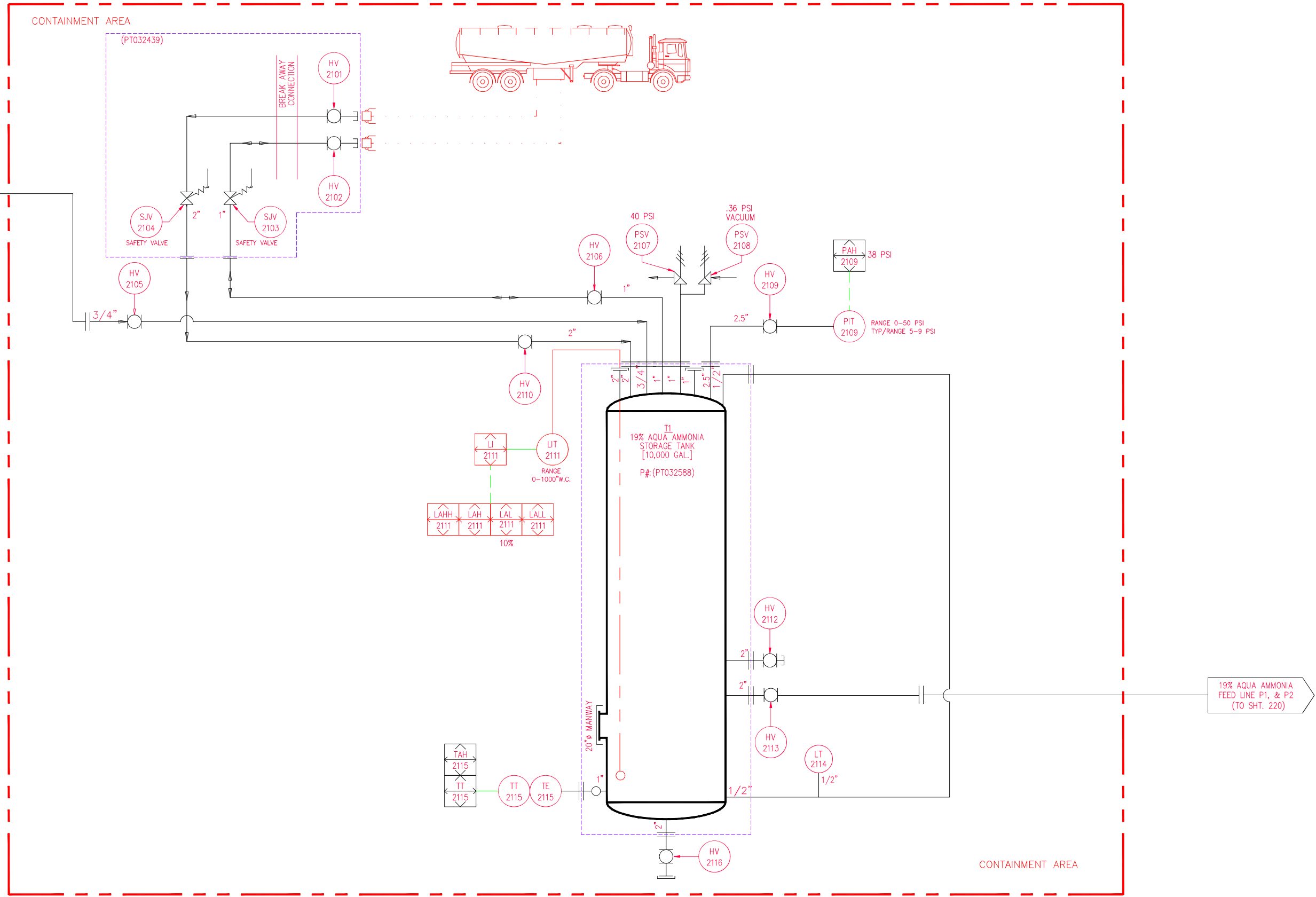
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Web: www.tri-mer.com E-Mail: engrg@tri-mer.com

|          |                              |                    |          |           |
|----------|------------------------------|--------------------|----------|-----------|
| CUSTOMER | O-1 CORPORATION PORTLAND, OR | P&ID: AMMONIA SKID | SHT. NO. | 220       |
| DWG. BY  | C.E.                         | SCALE              | FULL     | DWG. NO.  |
| APVD. BY |                              | DATE               | 05/17/22 | DWG. LIST |

P23.309-220

19% AQUA AMMONIA  
RETURN LINE P1,P2  
(FROM SHT. 220)



|            |     |
|------------|-----|
| REVISION 6 | --- |
| REVISION 5 | --- |
| REVISION 4 | --- |
| REVISION 3 | --- |
| REVISION 2 | --- |
| REVISION 1 | --- |

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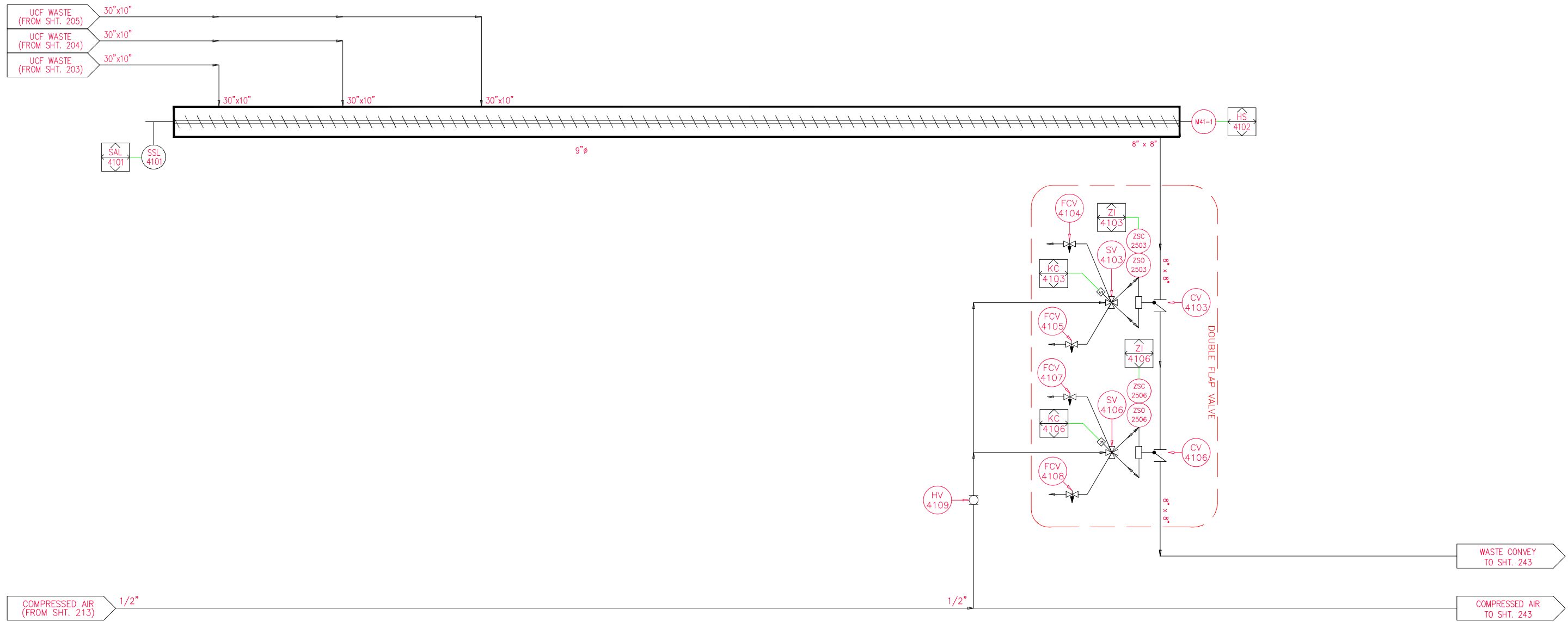
**Tri-Mer Corp.**  
Air Pollution Control Systems  
P.O. Box 390, Ames, IA 58507  
Tel: 712-723-7844 Fax: 712-723-7844  
Web: www.tri-mer.com E-Mail: engrg@tri-mer.com

|          |                              |                    |          |               |
|----------|------------------------------|--------------------|----------|---------------|
| CUSTOMER | O-I CORPORATION PORTLAND, OR | P&ID: AMMONIA TANK | SHT. NO. | 221           |
| DWG. BY  | C.E.                         | SCALE              | FULL     |               |
| APVD. BY |                              | DATE               | 05/17/22 | DWG. LIST     |
|          |                              |                    |          | J P23.309-221 |

J P23.309-221







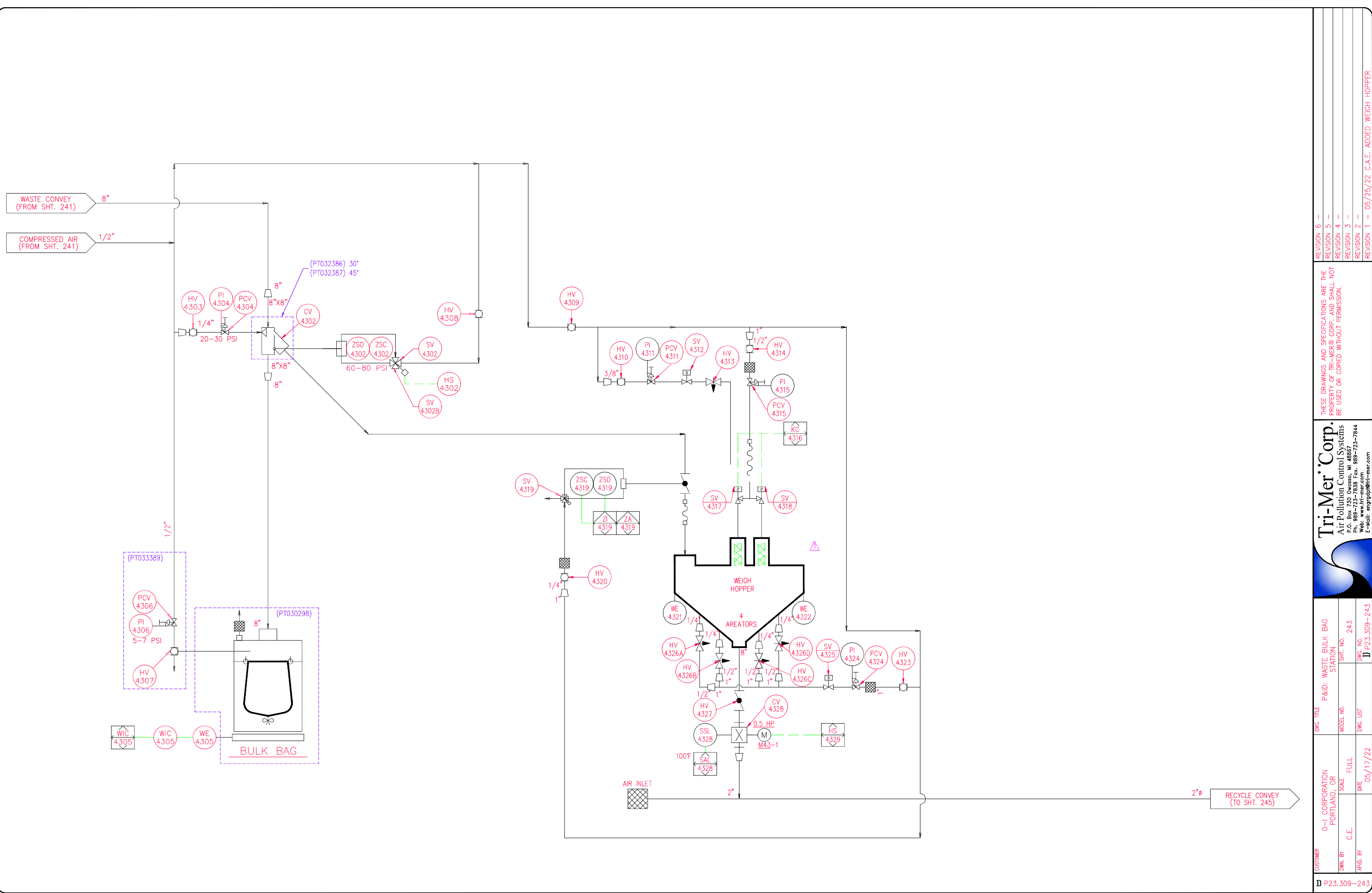
|            |     |
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| REVISION 6 | --- |
| REVISION 5 | --- |
| REVISION 4 | --- |
| REVISION 3 | --- |
| REVISION 2 | --- |
| REVISION 1 | --- |

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 Web: www.tri-mer.com  
 E-Mail: engrg@tri-mer.com

|          |                 |            |                              |
|----------|-----------------|------------|------------------------------|
| CUSTOMER | O-1 CORPORATION | DWG. TITLE | P&ID: WASTE BULK BAG STATION |
| DWG. BY  | C.E.            | SCALE      | FULL                         |
| APVD. BY | D               | DATE       | 05/17/22                     |
|          |                 | SHT. NO.   | 241                          |
|          |                 | DWG. NO.   | J P23.309-241                |

J P23.309-241

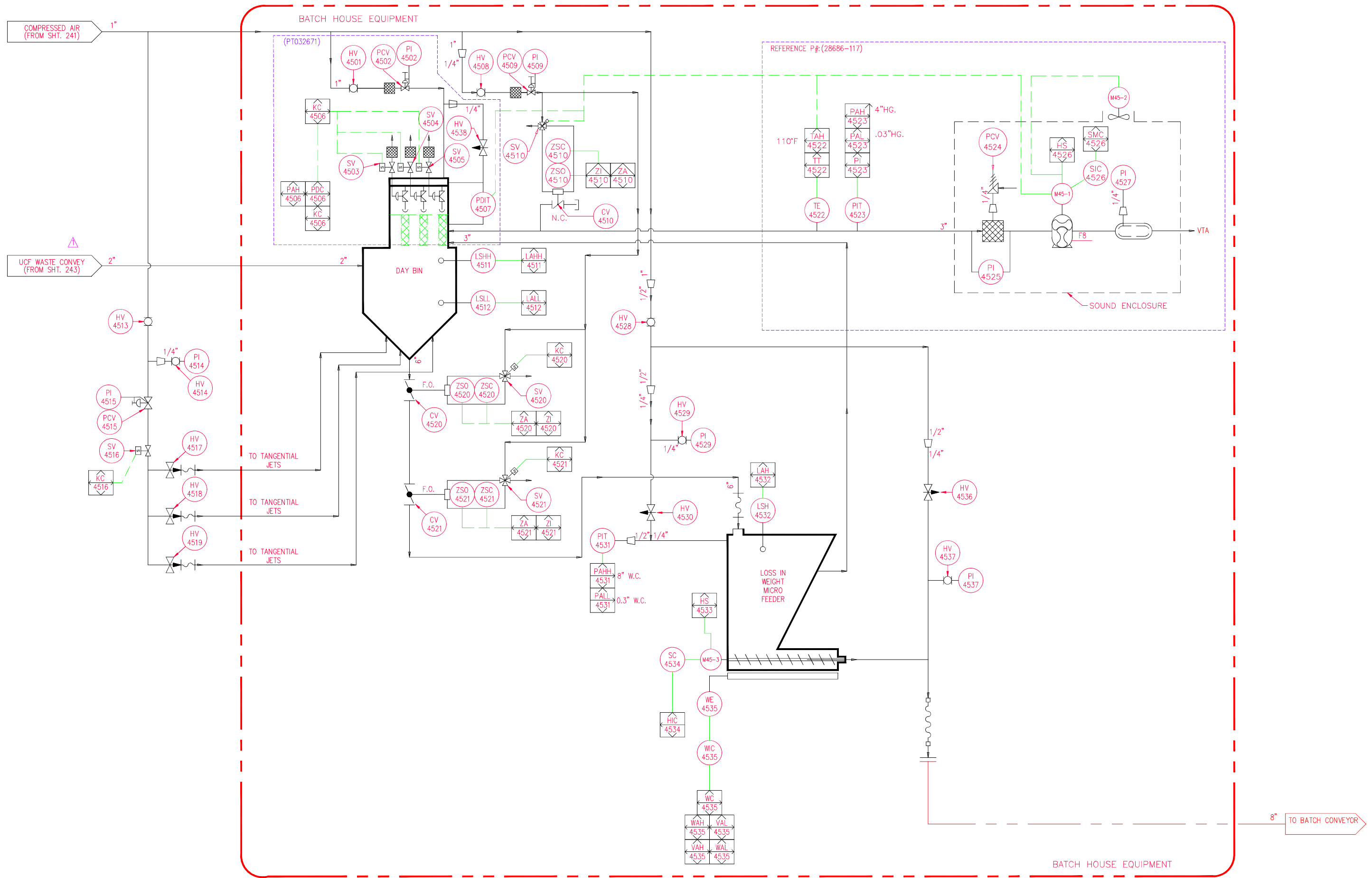


|            |                                    |
|------------|------------------------------------|
| REVISION 6 | ---                                |
| REVISION 5 | ---                                |
| REVISION 4 | ---                                |
| REVISION 3 | ---                                |
| REVISION 2 | ---                                |
| REVISION 1 | 05/25/22 C.A.E. ADDED WEIGH HOPPER |

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 Web: www.tri-mer.com  
 E-Mail: engrg@tri-mer.com

|          |                 |            |                              |
|----------|-----------------|------------|------------------------------|
| CUSTOMER | O-1 CORPORATION | DWG. TITLE | P&ID: WASTE BULK BAG STATION |
| DWN. BY  | C.E.            | MODEL NO.  | SHT. NO. 243                 |
| APVD. BY |                 | DWG. LIST  | DWG. NO. J P23.309-243       |
|          |                 | DATE       | 05/17/22                     |



|   |                 |                             |  |
|---|-----------------|-----------------------------|--|
| CUSTOMER  | O-1 CORPORATION |                             |  |
|   | PORTLAND, OR    |                             |  |
|   | SCALE           | FULL                        |  |
|   | C.E.            |                             |  |
| DWN. BY   | DATE            |                             |  |
|   | 05/17/22        |                             |  |
| APVD. BY  | DWG. NO.        |                             |  |
|   | P23.309-245     |                             |  |
| DWG. TITLE  |                 | P&ID: BATCH HOUSE EQUIPMENT |  |
| SHT. NO.  |                 | 245                         |  |
| MODEL NO.   |                 |                             |  |
| DATE  |                 | 05/17/22                    |  |
| DWG. LIST   |                 | J P23.309-245               |  |
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**Tri-Mer Corp.**  
 Air Pollution Control Systems  
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 Web: www.tri-mer.com E-Mail: engrgdp@tri-mer.com

## **Attachment D – Static Dust Filter Information**

Note: Preliminary information. At the time of this submittal the selection and procurement of these has not been finalized.



# SIDE ENTRY DUST COLLECTOR

The Nol-Tec side entry dust collector effectively filters dust laden air created by pneumatic conveying systems or other processes.

## STANDARD FEATURES:

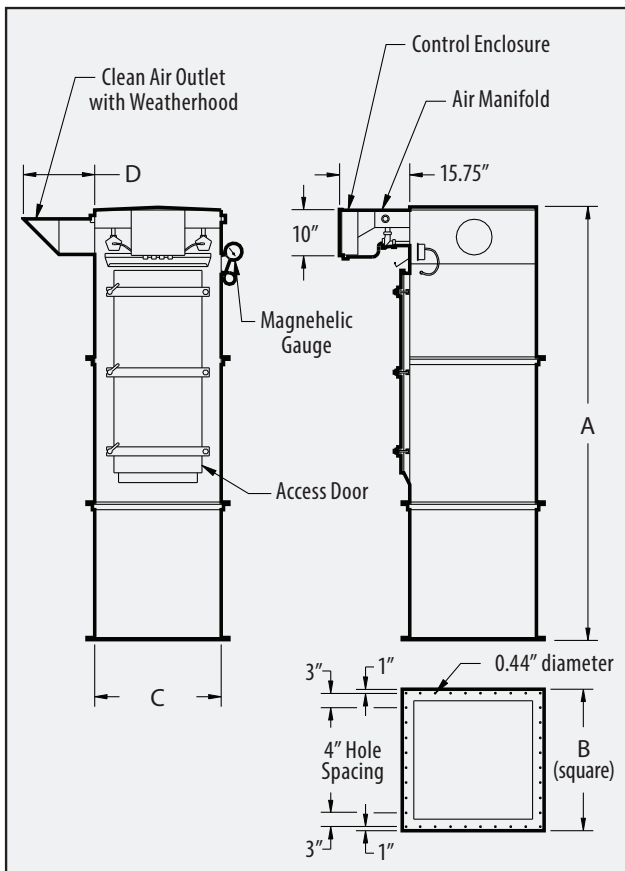
- Heavy gauge continuous welded construction
- Reinforced housing
- Venturi reverse jet cleaning
- Continuous cleaning design
- Bottom grid
- Cartridge or bag filter media
- Magnehelic gauge
- Bird screen and weatherhood
- Quick-release bag clamps
- Access door
- Designed up to 17" w.g.

## SPECIFICATIONS:

- **Compressed air:** Clean and dry at 80 PSIG minimum
- **Electrical:** 24VDC
- **Temperature:** Polyester bags 270° F; Polyester cartridge and urethane ends 225° F

## OPTIONAL FEATURES:

- Stainless steel construction
- Hazardous location design
- High-temperature design
- Variety of filter media materials available
- Exhauster
- Hopper bottom
- Additional access doors
- Differential automatic cleaning
- Electrical: 110-120V; 50-60Hz



Specifications subject to change without notice

| SIDE ENTRY DUST COLLECTOR |                       |                       |        |       |       |       |
|---------------------------|-----------------------|-----------------------|--------|-------|-------|-------|
| Model                     | Cartridge Filter Area | Bag Filter Area       | A      | B     | C     | D     |
| 36-NT-9                   | 180 ft <sup>2</sup>   | 41 ft <sup>2</sup>    | 60.0"  | 28.0" | 24.0" | 16.0" |
| 60-NT-9                   | 270 ft <sup>2</sup>   | 68 ft <sup>2</sup>    | 84.0"  | 28.0" | 24.0" | 16.0" |
| 84-NT-9                   | 540 ft <sup>2</sup>   | 95 ft <sup>2</sup>    | 108.0" | 28.0" | 24.0" | 16.0" |
| 36-NT-16                  | 320 ft <sup>2</sup>   | 72 ft <sup>2</sup>    | 60.0"  | 36.0" | 32.0" | 16.0" |
| 60-NT-16                  | 480 ft <sup>2</sup>   | 120 ft <sup>2</sup>   | 84.0"  | 36.0" | 32.0" | 16.0" |
| 84-NT-16                  | 960 ft <sup>2</sup>   | 168 ft <sup>2</sup>   | 108.0" | 36.0" | 32.0" | 16.0" |
| 60-NT-25                  | 750 ft <sup>2</sup>   | 188 ft <sup>2</sup>   | 84.0"  | 44.0" | 40.0" | 16.0" |
| 84-NT-25                  | 1,500 ft <sup>2</sup> | 263 ft <sup>2</sup>   | 108.0" | 44.0" | 40.0" | 16.0" |
| 60-NT-36                  | 1,080 ft <sup>2</sup> | 270 ft <sup>2</sup>   | 84.0"  | 52.0" | 48.0" | 20.0" |
| 84-NT-36                  | 2,160 ft <sup>2</sup> | 378 ft <sup>2</sup>   | 108.0" | 52.0" | 48.0" | 20.0" |
| 60-NT-49                  | 1,470 ft <sup>2</sup> | 368 ft <sup>2</sup>   | 84.0"  | 60.0" | 56.0" | 20.0" |
| 84-NT-49                  | 2,940 ft <sup>2</sup> | 515 ft <sup>2</sup>   | 108.0" | 60.0" | 56.0" | 20.0" |
| 60-NT-64                  | 1,920 ft <sup>2</sup> | 480 ft <sup>2</sup>   | 84.0"  | 68.0" | 64.0" | 20.0" |
| 84-NT-64                  | 3,840 ft <sup>2</sup> | 672 ft <sup>2</sup>   | 108.0" | 68.0" | 64.0" | 20.0" |
| 60-NT-81                  | 2,430 ft <sup>2</sup> | 608 ft <sup>2</sup>   | 84.0"  | 76.0" | 72.0" | 20.0" |
| 84-NT-81                  | 4,860 ft <sup>2</sup> | 851 ft <sup>2</sup>   | 108.0" | 76.0" | 72.0" | 20.0" |
| 60-NT-100                 | 3,000 ft <sup>2</sup> | 750 ft <sup>2</sup>   | 84.0"  | 84.0" | 80.0" | 20.0" |
| 84-NT-100                 | 6,000 ft <sup>2</sup> | 1,050 ft <sup>2</sup> | 108.0" | 84.0" | 80.0" | 20.0" |

\*Larger size models available upon request

## TRUSTED TO DELIVER™

Nol-Tec Systems, Inc | 425 Apollo Drive | Lino Lakes, MN 55014  
651.780.8600 | sales@nol-tec.com | www.nol-tec.com

5.014.SALE.10.23.18.04





# SINGLE BAG/CARTRIDGE DUST FILTERS

*Nol-Tec single bag/cartridge dust filters effectively filter dust laden air created by hopper filling applications.*

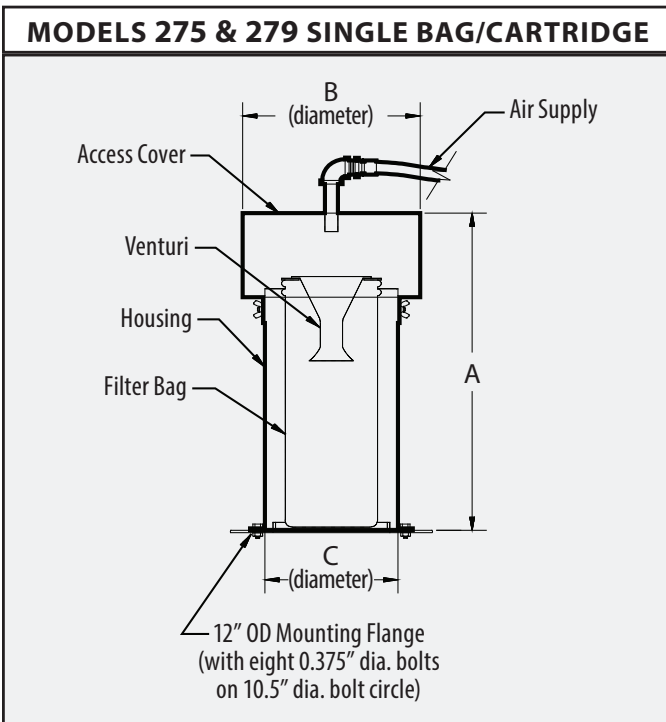
## STANDARD FEATURES:

- Venturi reverse jet cleaning
- Top filter element removal (Model 279)
- Bottom filter element removal (Model 317)
- 100% material recovery
- **Compressed air:** Clean and dry at 80 PSIG minimum
- **Electrical:** 24VDC
- **Temperature range:** Polyester bags 2700; Polyester cartridge & urethane ends 2250 F

## OPTIONAL FEATURES:

- Stainless steel construction
- Coatings and finishes
- Variety of filter media materials available
- Variety of mounting arrangements
- **Electrical:** 110-120V; 50-60Hz

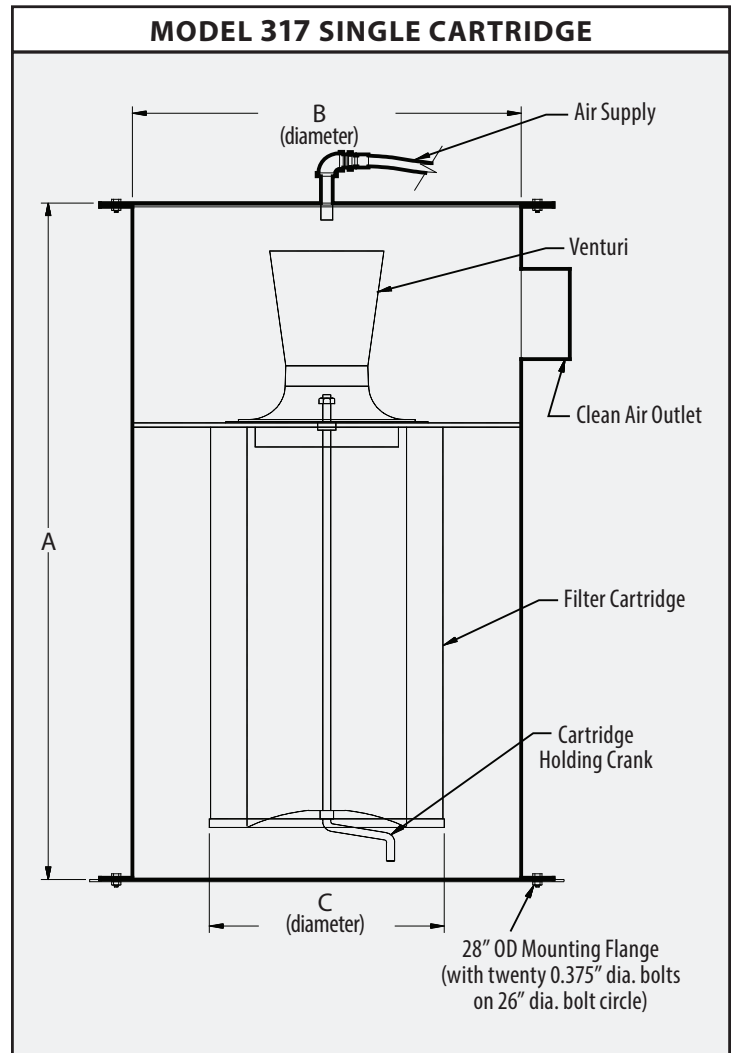
### MODELS 275 & 279 SINGLE BAG/CARTRIDGE



| SINGLE BAG/CARTRIDGE DUST FILTERS |           |                      |       |     |        |
|-----------------------------------|-----------|----------------------|-------|-----|--------|
| MODEL                             | TYPE      | FILTER AREA          | A     | B   | C      |
| 279-225                           | Bag       | 2.25 ft <sup>2</sup> | 25"   | 12" | 9"     |
| 279-450                           | Bag       | 4.5 ft <sup>2</sup>  | 43"   | 12" | 9"     |
| 279-3000                          | Cartridge | 30 ft <sup>2</sup>   | 43"   | 12" | 9"     |
| 275-5000                          | Cartridge | 50 ft <sup>2</sup>   | 27.5" | 17" | 14"    |
| 317-9000                          | Cartridge | 90 ft <sup>2</sup>   | 33"   | 24" | 12.75" |

Specifications subject to change without notice.

### MODEL 317 SINGLE CARTRIDGE



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651.780.8600 | sales@nol-tec.com | www.nol-tec.com

5.025.SALE.10.23.18.03



# **Attachment E – Emission Calculations**

## Table E-1: Emissions from Natural Gas Fired Duct Burner

Emission Unit ID: EU-4  
Emission Point ID: CCF01

### General Description of Emission Calculation Methodology

The duct burner will only be used during low flow/temperature conditions which occur infrequently. Emission calculations below are based on the duct burners potential to emit. Combustion gases will be routed to the CCF system so emissions of NO<sub>x</sub>, SO<sub>2</sub> and PM/PM<sub>10</sub>/PM<sub>2.5</sub> are not included as the CCF system will control potential emissions of those pollutants.

### **Operating Parameters & Input Assumptions:**

|                                |                           |
|--------------------------------|---------------------------|
| # of units                     | 1                         |
| Rating                         | 7.5 MMBtu/hr              |
| HHV Natural Gas                | 1,020 Btu/ft <sup>3</sup> |
| Max. Daily Operating Hours     | 24                        |
| Max. Annual Operating Hours    | 8760                      |
| Max. Annual Operating Capacity | 100%                      |
| Max. Annual Natural Gas Usage  | 65700.0 MMBtu/yr          |
| Max. Annual Natural Gas Usage  | 64.41 MMCF/yr             |

### **Total Fuel Usage**

|                          |                  |
|--------------------------|------------------|
| Annual Natural Gas Usage | 65700.0 MMBtu/yr |
| Annual Natural Gas Usage | 64.41 MMCF/yr    |
| Daily Natural Gas Usage  | 0.1765 MMCF/day  |
| Hourly Natural Gas Usage | 0.00735 MMCF/hr  |

| <i>Criteria Pollutants(1)</i>          |                               |                          |                           |                        |
|--|-------------------------------|--------------------------|---------------------------|------------------------|
| Pollutant                              | Emission Factor<br>(lb/MMCF)  | Emission Rate<br>(lb/hr) | Emission Rate<br>(lb/day) | Emission Rate<br>(tpy) |
| NO <sub>x</sub>                        | see emissions from CCF system |                          |                           |                        |
| CO                                     | 84                            | 0.62                     | 14.82                     | 2.71                   |
| VOC                                    | 5.5                           | 0.04                     | 0.97                      | 0.18                   |
| PM/PM <sub>10</sub> /PM <sub>2.5</sub> | see emissions from CCF system |                          |                           |                        |
| SO <sub>2</sub>                        | see emissions from CCF system |                          |                           |                        |

(1) Emission factor from ODEQ, AQ-EF05

| <i>Greenhouse Gases(2)</i> |                               |                        |
|----------------------------|-------------------------------|------------------------|
| Pollutant                  | Emission Factor<br>(kg/MMBtu) | Emission Rate<br>(tpy) |
| CO <sub>2</sub> e          | 53.1148                       | 3846.67                |

(2) Emission factor from EPA, 40 CFR Part 98, Subpart C



**Table E-1: Emissions from Natural Gas Fired Duct Burner (cont)**

| <i>Toxic Air Contaminants (TACs)(3)</i>      |            |                           |                          |                          |
|--|------------|---------------------------|--------------------------|--------------------------|
| Pollutant                                    | CAS        | Emission Factor (lb/MMCF) | Daily Emissions (lb/day) | Annual Emissions (lb/yr) |
| Benzene                                      | 71-43-2    | 0.008                     | 1.41E-03                 | 5.15E-01                 |
| Formaldehyde                                 | 50-00-0    | 0.017                     | 3.00E-03                 | 1.10E+00                 |
| Polycyclic aromatic hydrocarbons (PAHs)      | 401        | 0.0001                    | 1.76E-05                 | 6.44E-03                 |
| Benzo[a]pyrene                               | 50-32-8    | 0.0000012                 | 2.12E-07                 | 7.73E-05                 |
| Naphthalene                                  | 91-20-3    | 0.0003                    | 5.29E-05                 | 1.93E-02                 |
| Acetaldehyde                                 | 75-07-0    | 0.0043                    | 7.59E-04                 | 2.77E-01                 |
| Acrolein                                     | 107-02-8   | 0.0027                    | 4.76E-04                 | 1.74E-01                 |
| Ammonia                                      | 7664-41-7  | 9.1                       | 1.61E+00                 | 5.86E+02                 |
| Arsenic and compounds                        | 7440-38-2  | 0.0002                    | 3.53E-05                 | 1.29E-02                 |
| Barium and compounds                         | 7440-39-3  | 0.0044                    | 7.76E-04                 | 2.83E-01                 |
| Beryllium and compounds                      | 7440-41-7  | 0.000012                  | 2.12E-06                 | 7.73E-04                 |
| Cadmium and compounds                        | 7440-43-9  | 0.0011                    | 1.94E-04                 | 7.09E-02                 |
| Chromium VI, chromate and dichromate par     | 18540-29-9 | 0.0014                    | 2.47E-04                 | 9.02E-02                 |
| Cobalt and compounds                         | 7440-48-4  | 0.000084                  | 1.48E-05                 | 5.41E-03                 |
| Copper and compounds                         | 7440-50-8  | 0.00085                   | 1.50E-04                 | 5.48E-02                 |
| Ethyl benzene                                | 100-41-4   | 0.0095                    | 1.68E-03                 | 6.12E-01                 |
| Hexane                                       | 110-54-3   | 0.0063                    | 1.11E-03                 | 4.06E-01                 |
| Lead and compounds                           | 7439-92-1  | 0.0005                    | 8.82E-05                 | 3.22E-02                 |
| Manganese and compounds                      | 7439-96-5  | 0.00038                   | 6.71E-05                 | 2.45E-02                 |
| Mercury and compounds                        | 7439-97-6  | 0.00026                   | 4.59E-05                 | 1.67E-02                 |
| Molybdenum trioxide                          | 1313-27-5  | 0.00165                   | 2.91E-04                 | 1.06E-01                 |
| Nickel compounds, insoluble                  | 365        | 0.0021                    | 3.71E-04                 | 1.35E-01                 |
| Selenium and compounds                       | 7782-49-2  | 0.000024                  | 4.24E-06                 | 1.55E-03                 |
| Toluene                                      | 108-88-3   | 0.0366                    | 6.46E-03                 | 2.36E+00                 |
| Vanadium (fume or dust)                      | 7440-62-2  | 0.0023                    | 4.06E-04                 | 1.48E-01                 |
| Xylene (mixture), including m-xylene, o-xyle | 1330-20-7  | 0.0272                    | 4.80E-03                 | 1.75E+00                 |
| Zinc and compounds                           | 7440-66-6  | 0.029                     | 5.12E-03                 | 1.87E+00                 |
| Total TACs (lb/yr)                           |            |                           |                          | 596.21                   |
| Total HAPs (tpy)                             |            |                           |                          | 0.0038                   |

(3) TAC Emission Factors from ODEQ ATEI Combustion Emission Factor Tool: WebFIRE/ AP-42 Section 1.4 (metals); SCAQMD AB2588 - Default Emission Factors for Fuel Combustion, Table B-1

## Table E-2: Emissions from Sorbent Storage Silo

Emission Unit ID: EU-11aia

Emission Point ID: SS02

### General Description of Emission Calculation Methodology

Dust laden air inside the silo can be displaced and vented to the atmosphere through a static cartridge-type filter resulting in minor amount of PM2.5 emissions.

Use AP-42 emission factors and control efficiencies from EPA air pollution control fact sheets to estimate

### **Operating Parameters & Input Assumptions:**

|                                   |                 |
|-----------------------------------|-----------------|
| Maximum Hourly Sorbent Usage Rate | 155 lb/hr       |
| Max. Daily Operating Hours        | 24 hr/day       |
| Max. Annual Operating Hours       | 8760 hr/yr      |
| Maximum Daily Sorbent Usage Rate  | 3720 lb/day     |
| Maximum Annual Sorbent Usage Rate | 1,357,800 lb/yr |
| Filter Removal Efficiency (1)     | 99.99%          |

| Pollutant     | Emission Factor<br>(2) (lb/ton) | Emission Rate<br>(lb/hr) | Emission Rate<br>(lb/day) | Emission Rate<br>(tpy) |
|---------------|---------------------------------|--------------------------|---------------------------|------------------------|
| PM/PM10/PM2.5 | 2.2                             | 0.000017                 | 0.00041                   | 0.000075               |

(1) EPA Air Pollution Control Technology Fact Sheet (APA-452/F-03-004) for Cartridge Filters

(2) AP-42 Table 11.17-4 for Product Transfer and Conveying

**Table E-3: Emissions from Controlled Furnace D (CCF System)**

Emission Unit ID: EU-4  
Emission Point ID: CCF01

General Description of Emission Calculation Methodology

- Emission factors for NOx, SO2, and total PM (as PM2.5) are being provided by the proposed control device manufacturer.  
 - VOC and CO emission factors are for natural gas combustion byproducts as provided in condition 33.b.ii of the current air permit.  
 - GHG emissions are a result of natural gas combustion in the furnace and raw materials containing carbonates. Emission factors for both of these mechanisms are provided in 40 CFR Part 98.  
 - TAC emission factors are from the currently approved Cleaner Air Oregon emissions inventory. The largest emission factor between green glass or amber glass production is provided in the table below. The ammonia emission factor for external combustion of natural gas has been changed because the control device will include SCR for NOx control. The CCF system will remove significant portions of metal TACs but the emission factors provide below reflect an uncontrolled emission rate.

**Operating Parameters & Input Assumptions:**

|  |                |  |
|--|----------------|--|
| Glass Production Rate                  | 7.95 tons/hr   | (max. rate from 2019-2020 testing)             |
| Max. Daily Operating Hours             | 24 hr/day      |  |
| Max. Annual Operating Hours            | 8760 hr/yr     |  |
| Maximum Daily Glass Production Rate    | 190.8 tons/day |  |
| Maximum Annual Glass Production Rate   | 70,000 tons/yr |  |
| Maximum Annual NG Usage - Furnace D    | 242 MMCF/yr    | (CAO EI requested PTE NG Usage for Furnace D)  |
| Maximum Daily NG Usage - Furnace D     | 0.80 MMCF/day  | (CAO EI requested PTE NG Usage for Furnace D)  |
| Maximum Hourly NG Usage - Furnace D    | 0.028 MMCF/hr  |  |
| Natural Gas HHV                        | 1,020 Btu/CF   |  |
| Furnace D Limestone Raw Material Usage | 6,974 tons/yr  | (Page A10, RR Detail Sheets, 08/08/2018 DRAFT) |
| Furnace D Soda Ash Raw Material Usage  | 7,262 tons/yr  | (Page A10, RR Detail Sheets, 08/08/2018 DRAFT) |
| Assumed RE of Metal Particulate by CCF | 0%             |  |

| <i>Criteria Pollutants (1)</i> |                     |                       |                       |                        |                     |
|--------------------------------|---------------------|-----------------------|-----------------------|------------------------|---------------------|
| Criteria Pollutant             | Emission Factor (1) | Emission Factor Units | Emission Rate (lb/hr) | Emission Rate (lb/day) | Emission Rate (tpy) |
| NOx                            | 1.2                 | lb/ton                | 9.54                  | 228.96                 | 42.00               |
| CO                             | 35                  | lb/MMCF               | 0.97                  | 27.85                  | 4.24                |
| VOC                            | 5.8                 | lb/MMCF               | 0.16                  | 4.61                   | 0.70                |
| PM/PM10/PM2.5                  | 0.20                | lb/ton                | 1.59                  | 38.16                  | 7.00                |
| SO2                            | 0.8                 | lb/ton                | 6.36                  | 152.64                 | 28.00               |

(1) Emission Factor Notes:  
 - NOx, PM and SO2 emission factors provided by air pollution control system manufacturer.

| <i>Greenhouse Gases - Natural Gas Combustion(2)</i> |                            |                     |
|---|----------------------------|---------------------|
| Pollutant   | Emission Factor (kg/MMBtu) | Emission Rate (tpy) |
| CO2e  | 53.1148                    | 14452.23            |

(2) Emission factor from EPA, 40 CFR Part 98, Subpart C

| <i>Greenhouse Gases - Raw Material Usage(3)</i> |                                   |                     |
|---|-----------------------------------|---------------------|
| Pollutant                                       | Emission Factor (ton CO2e/ton RM) | Emission Rate (tpy) |
| CO2e - Limestone Addition                       | 0.44                              | 3068.72             |
| CO2e - Soda Ash Addition                        | 0.415                             | 3013.80             |

(3) Emission factor from EPA, 40 CFR Part 98, Subpart N

**Table E-3: Emissions from Controlled Furnace D (CCF System) (cont.)**

| <i>Toxic Air Contaminants (TACs)(4)</i>      |            |                 |                       |                          |                          |
|--|------------|-----------------|-----------------------|--------------------------|--------------------------|
| Pollutant                                    | CAS        | Emission Factor | Emission Factor Units | Daily Emissions (lb/day) | Annual Emissions (lb/yr) |
| Arsenic and compounds                        | 7440-38-2  | 0.000556        | lb/ton                | 1.06E-01                 | 3.89E+01                 |
| Beryllium and compounds                      | 7440-41-7  | 0.000000118     | lb/ton                | 2.25E-05                 | 8.26E-03                 |
| Cadmium and compounds                        | 7440-43-9  | 0.0000537       | lb/ton                | 1.02E-02                 | 3.76E+00                 |
| Chromium VI, chromate, and dichromate pa     | 18540-29-9 | 0.000000478     | lb/ton                | 9.12E-05                 | 3.35E-02                 |
| Lead and compounds                           | 7439-92-1  | 0.00651         | lb/ton                | 1.24E+00                 | 4.56E+02                 |
| Manganese and compounds                      | 7439-96-5  | 0.0000155       | lb/ton                | 2.96E-03                 | 1.09E+00                 |
| Mercury and compounds                        | 7439-97-6  | 0.00000907      | lb/ton                | 1.73E-03                 | 6.35E-01                 |
| Nickel and compounds                         | 7440-02-0  | 0.0000264       | lb/ton                | 5.04E-03                 | 1.85E+00                 |
| Selenium and compounds                       | 7782-49-2  | 0.000363        | lb/ton                | 6.93E-02                 | 2.54E+01                 |
| Antimony and compounds                       | 7440-36-0  | 0.0000296       | lb/ton                | 5.65E-03                 | 2.07E+00                 |
| Cobalt and compounds                         | 7440-48-4  | 0.00000106      | lb/ton                | 2.02E-04                 | 7.42E-02                 |
| Copper and compounds                         | 7440-50-8  | 0.0000877       | lb/ton                | 1.67E-02                 | 6.14E+00                 |
| Formaldehyde                                 | 50-00-0    | 0.00026         | lb/ton                | 4.96E-02                 | 1.82E+01                 |
| Acetaldehyde                                 | 75-07-0    | 0.0214          | lb/MMCF               | 1.70E-02                 | 5.18E+00                 |
| Acrolein                                     | 107-02-8   | 0.000018        | lb/MMCF               | 1.43E-05                 | 4.36E-03                 |
| Arsenic and compounds                        | 7440-38-2  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Barium and compounds                         | 7440-39-3  | 0.0044          | lb/MMCF               | 3.50E-03                 | 1.06E+00                 |
| Benzene                                      | 71-43-2    | 0.0021          | lb/MMCF               | 1.67E-03                 | 5.08E-01                 |
| Beryllium and compounds                      | 7440-41-7  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Cadmium and compounds                        | 7440-43-9  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Chromium VI, chromate, and dichromate pa     | 18540-29-9 | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Cobalt and compounds                         | 7440-48-4  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Copper and compounds                         | 7440-50-8  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Ethyl benzene                                | 100-41-4   | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Formaldehyde                                 | 50-00-0    | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Hexane                                       | 110-54-3   | 1.8             | lb/MMCF               | 1.43E+00                 | 4.36E+02                 |
| Manganese and compounds                      | 7439-96-5  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Mercury and compounds                        | 7439-97-6  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Molybdenum trioxide                          | 1313-27-5  | 0.00165         | lb/MMCF               | 1.31E-03                 | 3.99E-01                 |
| Nickel and compounds                         | 7440-02-0  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Acenaphthene                                 | 83-32-9    | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Acenaphthylene                               | 208-96-8   | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Anthracene                                   | 120-12-7   | 0.0000024       | lb/MMCF               | 1.91E-06                 | 5.81E-04                 |
| Benz[a]anthracene                            | 56-55-3    | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Benzo[a]pyrene                               | 50-32-8    | 0.0000012       | lb/MMCF               | 9.55E-07                 | 2.90E-04                 |
| Benzo[b]fluoranthene                         | 205-99-2   | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Benzo[g,h,i]perylene                         | 191-24-2   | 0.0000012       | lb/MMCF               | 9.55E-07                 | 2.90E-04                 |
| Benzo[k]fluoranthene                         | 207-08-9   | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Chrysene                                     | 218-01-9   | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Dibenz[a,h]acridine                          | 226-36-8   | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Fluoranthene                                 | 206-44-0   | 0.000003        | lb/MMCF               | 2.39E-06                 | 7.26E-04                 |
| Fluorene                                     | 86-73-7    | 0.0000028       | lb/MMCF               | 2.23E-06                 | 6.78E-04                 |
| Indeno[1,2,3-cd]pyrene                       | 193-39-5   | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| 2-Methyl naphthalene                         | 91-57-6    | 0.000024        | lb/MMCF               | 1.91E-05                 | 5.81E-03                 |
| Naphthalene                                  | 91-20-3    | 0.00061         | lb/MMCF               | 4.85E-04                 | 1.48E-01                 |
| Phenanthrene                                 | 85-01-8    | 0.000017        | lb/MMCF               | 1.35E-05                 | 4.11E-03                 |
| Pyrene                                       | 129-00-0   | 0.000005        | lb/MMCF               | 3.98E-06                 | 1.21E-03                 |
| 7,12-Dimethylbenz[a]anthracene               | 57-97-6    | 0.000016        | lb/MMCF               | 1.27E-05                 | 3.87E-03                 |
| 3-Methylcholanthrene                         | 56-49-5    | 0.0000018       | lb/MMCF               | 1.43E-06                 | 4.36E-04                 |
| Selenium and compounds                       | 7782-49-2  | 0.000024        | lb/MMCF               | 1.91E-05                 | 5.81E-03                 |
| Toluene                                      | 108-88-3   | 0.0034          | lb/MMCF               | 2.71E-03                 | 8.23E-01                 |
| Vanadium (fume or dust)                      | 7440-62-2  | 0.0023          | lb/MMCF               | 1.83E-03                 | 5.57E-01                 |
| Xylene (mixture), including m-xylene, o-xyle | 1330-20-7  | 0               | lb/MMCF               | 0.00E+00                 | 0.00E+00                 |
| Zinc and compounds                           | 7440-66-6  | 0.029           | lb/MMCF               | 2.31E-02                 | 7.02E+00                 |
| Ammonia                                      | 7664-41-7  | 9.1             | lb/MMCF               | 7.24E+00                 | 2.20E+03                 |
| Total TACs (lb/yr)                           |            |                 |                       |                          | 3,207.41                 |
| Total HAPs (tpy)                             |            |                 |                       |                          | 0.50                     |

(4) TAC emission factors from the currently approved Cleaner Air Oregon EI. Ammonia emission factor changed to 9.1 lb/MMCF for equipment with SCR per SCAQMD AB2588 - Default Emission Factors for Fuel Combustion, Table B-1.

## Table E-4: Emissions from Solids Handling

Emission Unit ID: EU-12aia  
Emission Point IDs: BB03  
WH04  
DB05

### General Description of Emission Calculation Methodology

Solids generated by the CCF system are conveyed by enclosed screw augers or pneumatically. Dust laden air at the bulk bagging system, weigh hopper or day bin can be displaced and vented to the atmosphere through a static cartridge-type filter resulting in minor amount of PM2.5 emissions. For the purposes of estimating emissions 100% of the solids generated by the CCF are assumed to be sent to both the bagging station and returned to the existing batch house for reuse.

Use AP-42 emission factors and control efficiencies from EPA air pollution control fact sheets to estimate emissions of PM2.5.

Trace amounts of metals emitted by Furnace D will be present in the solids generated by the CCF. The amount of metals present in the solids can be conservatively estimated by assuming 100% of the metals generated by Furnace D (see Table E-3) are removed by the CCF system.

### Operating Parameters & Input Assumptions:

|                                      |                 |                 |
|--------------------------------------|-----------------|-----------------|
| Maximum Hourly Sorbent Usage Rate    | 181 lb/hr       |                 |
| Max. Daily Operating Hours           | 24 hr/day       |                 |
| Max. Annual Operating Hours          | 8760 hr/yr      |                 |
| Maximum Daily Sorbent Usage Rate     | 4344 lb/day     |                 |
| Maximum Annual Sorbent Usage Rate    | 1,585,560 lb/yr |                 |
| Filter Removal Efficiency (1)        | 99.99%          |                 |
| Glass Production Rate                | 7.95 tons/hr    | (See Table E-3) |
| Max. Daily Operating Hours           | 24 hr/day       |                 |
| Max. Annual Operating Hours          | 8760 hr/yr      |                 |
| Maximum Daily Glass Production Rate  | 191 tons/day    |                 |
| Maximum Annual Glass Production Rate | 70000 tons/yr   |                 |

**Table E-4: Emissions from Solids Handling (cont.)**

| Pollutant                                | CAS        | Emission Factor (2) | Emission Factor Units | Bulk Bagging (BB03)   |                        |                       | Weigh Hopper (WH04)   |                        |                       | Day Bin (DB05)        |                        |                       |
|--|------------|---------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|------------------------|-----------------------|
|  |            |                     |                       | Emission Rate (lb/hr) | Emission Rate (lb/day) | Emission Rate (lb/yr) | Emission Rate (lb/hr) | Emission Rate (lb/day) | Emission Rate (lb/yr) | Emission Rate (lb/hr) | Emission Rate (lb/day) | Emission Rate (lb/yr) |
| PM/PM10/PM2.5                            | -          | 2.2                 | lb/ton-solids         | 0.000020              | 0.00048                | 0.174412              | 0.000020              | 0.00048                | 0.174412              | 0.000020              | 0.00048                | 0.174412              |
| Arsenic and compounds                    | 7440-38-2  | 0.000556            | lb/ton-glass          | 4.42E-07              | 1.06E-05               | 3.89E-03              | 4.42E-07              | 1.06E-05               | 3.89E-03              | 4.42E-07              | 1.06E-05               | 3.89E-03              |
| Beryllium and compounds                  | 7440-41-7  | 0.000000118         | lb/ton-glass          | 9.38E-11              | 2.25E-09               | 8.26E-07              | 9.38E-11              | 2.25E-09               | 8.26E-07              | 9.38E-11              | 2.25E-09               | 8.26E-07              |
| Cadmium and compounds                    | 7440-43-9  | 0.0000537           | lb/ton-glass          | 4.27E-08              | 1.02E-06               | 3.76E-04              | 4.27E-08              | 1.02E-06               | 3.76E-04              | 4.27E-08              | 1.02E-06               | 3.76E-04              |
| Chromium VI, chromate, and dichromate pa | 18540-29-9 | 0.000000478         | lb/ton-glass          | 3.80E-10              | 9.12E-09               | 3.35E-06              | 3.80E-10              | 9.12E-09               | 3.35E-06              | 3.80E-10              | 9.12E-09               | 3.35E-06              |
| Lead and compounds                       | 7439-92-1  | 0.00651             | lb/ton-glass          | 5.18E-06              | 1.24E-04               | 4.56E-02              | 5.18E-06              | 1.24E-04               | 4.56E-02              | 5.18E-06              | 1.24E-04               | 4.56E-02              |
| Manganese and compounds                  | 7439-96-5  | 0.0000155           | lb/ton-glass          | 1.23E-08              | 2.96E-07               | 1.08E-04              | 1.23E-08              | 2.96E-07               | 1.08E-04              | 1.23E-08              | 2.96E-07               | 1.08E-04              |
| Mercury and compounds                    | 7439-97-6  | 0.00000907          | lb/ton-glass          | 7.21E-09              | 1.73E-07               | 6.35E-05              | 7.21E-09              | 1.73E-07               | 6.35E-05              | 7.21E-09              | 1.73E-07               | 6.35E-05              |
| Nickel and compounds                     | 7440-02-0  | 0.0000264           | lb/ton-glass          | 2.10E-08              | 5.04E-07               | 1.85E-04              | 2.10E-08              | 5.04E-07               | 1.85E-04              | 2.10E-08              | 5.04E-07               | 1.85E-04              |
| Selenium and compounds                   | 7782-49-2  | 0.000363            | lb/ton-glass          | 2.89E-07              | 6.93E-06               | 2.54E-03              | 2.89E-07              | 6.93E-06               | 2.54E-03              | 2.89E-07              | 6.93E-06               | 2.54E-03              |
| Antimony and compounds                   | 7440-36-0  | 0.0000296           | lb/ton-glass          | 2.35E-08              | 5.65E-07               | 2.07E-04              | 2.35E-08              | 5.65E-07               | 2.07E-04              | 2.35E-08              | 5.65E-07               | 2.07E-04              |
| Cobalt and compounds                     | 7440-48-4  | 0.00000106          | lb/ton-glass          | 8.43E-10              | 2.02E-08               | 7.42E-06              | 8.43E-10              | 2.02E-08               | 7.42E-06              | 8.43E-10              | 2.02E-08               | 7.42E-06              |
| Copper and compounds                     | 7440-50-8  | 0.0000877           | lb/ton-glass          | 6.97E-08              | 1.67E-06               | 6.14E-04              | 6.97E-08              | 1.67E-06               | 6.14E-04              | 6.97E-08              | 1.67E-06               | 6.14E-04              |
| Total TACs (lb/yr)                       |            |                     |                       |                       |                        | 2.28E-01              |                       |                        |                       | 2.28E-01              |                        |                       |
| Total HAPs (tpy)                         |            |                     |                       |                       |                        | 1.14E-04              |                       |                        |                       | 1.14E-04              |                        |                       |

(1) EPA Air Pollution Control Technology Fact Sheet (APA-452/F-03-004) for Cartridge Filters

(2) PM emission factor from AP-42 Table 11.17-4 for Product Transfer and Conveying

TAC emission factor from currently approved Cleaner Air Oregon EI.

**Table E-5: Summary of Project Emissions**

| Pollutant                |         | Emission Sources              |                     |                     |                     |                | Total Project Emissions |
|--------------------------|---------|-------------------------------|---------------------|---------------------|---------------------|----------------|-------------------------|
|                          |         | Controlled Furnace D (CCF01)* | Sorbent Silo (SS02) | Bulk Bagging (BB03) | Weigh Hopper (WH04) | Day Bin (DB05) |                         |
| NOx                      | tons/yr | 42.0                          |                     |                     |                     |                | 42.0                    |
| CO                       | tons/yr | 6.9                           |                     |                     |                     |                | 6.9                     |
| VOC                      | tons/yr | 0.9                           |                     |                     |                     |                | 0.9                     |
| PM/PM10/PM2.5            | tons/yr | 7.0                           | 0.000075            | 0.000087            | 0.000087            | 0.000087       | 7.0                     |
| SO2                      | tons/yr | 28.0                          |                     |                     |                     |                | 28.0                    |
| CO2e                     | tons/yr | 24381.4                       |                     |                     |                     |                | 24381.4                 |
| Hazardous Air Pollutants | tons/yr | 0.5                           |                     | 0.000114            | 0.000114            | 0.000114       | 0.5                     |
| Toxic Air Contaminants   | lb/yr   | 3803.6                        |                     | 0.23                | 0.23                | 0.23           | 3804.3                  |

\*Includes emissions from duct burner

## Table E-6: PSEL Details

Furnace D Glass Production Levels

70,000 tpy  
190.80 ton/day  
7.95 ton/hr

### PM10 Emissions

| EU ID           | EU Description                   | Annual Activity Level | Units   | Emission Factor | Units          | Ref.   | Annual Emissions (tpy) |
|-----------------|----------------------------------|-----------------------|---------|-----------------|----------------|--------|------------------------|
| EU1 - RMBH1     | Raw Mat'l Handling - Truck       | 43,196.20             | tons/yr | 0.0018          | lb/ton raw mat | (1)    | 0.04                   |
| EU1/EU3 - RMBH2 | Raw Mat'l Handling - Batchhouse  | 43,196.20             | tons/yr | 0.0018          | lb/ton raw mat | (1)    | 0.04                   |
| EU1 Batchhouse  | Batchhouse Fugitive              | 8,760                 | hr/yr   | 0.0076          | lb/hr          | (2)    | 0.03                   |
| EU2             | Dump to Storage/Transfer Area    | 101,475.00            | tons/yr | 0.038           | lb/ton cullet  | (3)    | 1.92                   |
| EU2             | Dump to Cullet Crusher           | 59,500.00             | tons/yr | 0.019           | lb/ton cullet  | (3)    | 0.56                   |
| EU2             | Dump to Railcar Loading Hopper   | 41,975.00             | tons/yr | 0.038           | lb/ton cullet  | (3)    | 0.80                   |
| EU4             | Furnace D, including Duct Burner | 70,000.00             | tons/yr |                 |                | (4)    | 7.00                   |
| EU5 SWAB        | Mold Swab                        | 6,300.00              | lb/yr   | 1               | lb/lb swab mat | (1)    | 3.15                   |
| EU5 MBTT        | End Treat                        | 6.19                  | tons/yr | 22              | lb/ton         | (1)    | 0.07                   |
| EU6             | Misc. Nat. Gas                   | 137.41                | MMCF/yr | 2.5             | lb/MMCF        | (5)    | 0.17                   |
| EU7             | Boiler                           | 90.18                 | MMCF/yr | 2.5             | lb/MMCF        | (5)    | 0.11                   |
| EU10 MBD        | Mold Bench Dust Collector        | 2,920.00              | hr/yr   | 0.2             | lb/hr          | (1)    | 0.29                   |
| EU-11           | Sorbent Silo                     |                       |         |                 |                | (6)    | 0.000075               |
| EU-12           | Solids Handling                  |                       |         |                 |                | (7)    | 0.00026                |
|                 |                                  |                       |         |                 |                | Totals | 14.19                  |

### Emission Factor References:

- (1) Air permit emission factors condition 33.b.i
- (2) DEQ approved Cleaner Air Oregon Emissions Inventory
- (3) AP-42 Chapter 13.2.4. Wind speed = 8 mph, particle size multiplier = 0.35 for PM10 and moisture content 0.25%  
The Dump to Cullet Crusher activity is to a belowgrade dump pocket and the emission factor is reduced by 50%
- (4) See Table E-3
- (5) Air permit emission factors condition 33.b.iii  
NG usage based on 10.5 MMBtu/hr boiler and 16.0 MMBty/hr Misc. Units operating continuously at capacity
- (6) See Table E-2



**Table E-6: PSEL Details (cont.)**

**PM2.5 Emissions**

| EU ID           | EU Description                   | % PM2.5 of PM10* | Annual Emissions (tpy) |
|-----------------|----------------------------------|------------------|------------------------|
| EU1 - RMBH1     | Raw Mat'l Handling - Truck       | 100%             | 0.04                   |
| EU1/EU3 - RMBH2 | Raw Mat'l Handling - Batchhouse  | 100%             | 0.04                   |
| EU1 Batchhouse  | Batchhouse Fugitive              | 100%             | 0.03                   |
| EU2             | Dump to Storage/Transfer Area    | 6%               | 0.12                   |
| EU2             | Dump to Cullet Crusher           | 6%               | 0.03                   |
| EU2             | Dump to Railcar Loading Hopper   | 6%               | 0.05                   |
| EU4             | Furnace D, including Duct Burner | 100%             | 7.00                   |
| EU5 SWAB        | Mold Swab                        | 100%             | 3.15                   |
| EU5 MBTT        | End Treat                        | 100%             | 0.07                   |
| EU6             | Misc. Nat. Gas                   | 100%             | 0.17                   |
| EU7             | Boiler                           | 100%             | 0.11                   |
| EU10 MBD        | Mold Bench Dust Collector        | 100%             | 0.29                   |
| EU-11           | Sorbent Silo                     | 100%             | 0.000075               |
| EU-12           | Solids Handling                  | 100%             | 0.00026                |
|                 |                                  | <b>Total</b>     | <b>11.10</b>           |

\*Percentages from current air permit detail sheets however controlled Furnace D emissions considered 100% of PM10

**Table E-6: PSEL Details (cont.)**

**NOx Emissions**

| EU ID  | EU Description                   | Annual Activity Level | Units   | Emission Factor | Units   | Ref. | Annual Emissions (tpy) |
|--------|----------------------------------|-----------------------|---------|-----------------|---------|------|------------------------|
| EU4    | Furnace D, including Duct Burner | 70,000                | tons/yr |                 |         | (1)  | 42.00                  |
| EU6    | Misc. Nat. Gas                   | 137.41                | MMCF/yr | 100             | lb/MMCF | (2)  | 6.9                    |
| EU7    | Boiler                           | 90.18                 | MMCF/yr | 140             | lb/MMCF | (2)  | 6.3                    |
| Totals |                                  |                       |         |                 |         |      | 55.2                   |

Emission Factor References:

- (1) See Table E-3
- (2) Air permit emission factors condition 33.b.iii

**SO2 Emissions**

| EU ID  | EU Description                   | Activity Level | Units   | Emission Factor | Units   | Ref. | Annual Emissions (tpy) |
|--------|----------------------------------|----------------|---------|-----------------|---------|------|------------------------|
| EU4    | Furnace D, including Duct Burner | 70,000         | tons/yr |                 |         | (1)  | 28.00                  |
| EU6    | Misc. Nat. Gas                   | 137.41         | MMCF/yr | 2.6             | lb/MMCF | (2)  | 0.18                   |
| EU7    | Boiler                           | 90.18          | MMCF/yr | 2.6             | lb/MMCF | (2)  | 0.12                   |
| Totals |                                  |                |         |                 |         |      | 28.3                   |

Emission Factor References:

- (1) See Table E-3
- (2) Air permit emission factors condition 33.b.iii

**Table E-6: PSEL Details (cont.)**

**CO Emissions**

| EU ID  | EU Description | Activity Level | Units   | Emission Factor | Units   | Ref. | Annual Emissions (tpy) |
|--------|----------------|----------------|---------|-----------------|---------|------|------------------------|
| EU4    | Furnace D      | 242            | MMCF/yr |                 |         | (1)  | 4.24                   |
| EU4    | Duct Burner    |                |         |                 |         | (2)  | 2.71                   |
| EU6    | Misc. Nat. Gas | 137.41         | MMCF/yr | 21              | lb/MMCF | (3)  | 1.44                   |
| EU7    | Boiler         | 90.18          | MMCF/yr | 35              | lb/MMCF | (3)  | 1.58                   |
| Totals |                |                |         |                 |         |      | 10.0                   |

**Emission Factor References:**

- (1) See Table E-3
- (2) See Table E-1
- (3) Air permit emission factors condition 33.b.iii

**VOC Emissions**

| EU ID  | EU Description            | Activity Level | Units        | Emission Factor | Units   | Ref. | Annual Emissions (tpy) |
|--------|---------------------------|----------------|--------------|-----------------|---------|------|------------------------|
| EU4    | Furnace D                 | 242            | MMCF/hr      |                 |         | (1)  | 0.70                   |
| EU4    | Duct Burner               |                |              |                 |         | (2)  | 0.18                   |
| EU5    | Hot End Surface Treatment | 6.19           | tons MBTT/yr | 90              | lbs/ton | (3)  | 0.28                   |
| EU6    | Misc. Nat. Gas            | 137.41         | MMCF/yr      | 5.8             | lb/MMCF | (4)  | 0.40                   |
| EU7    | Boiler                    | 90.18          | MMCF/yr      | 5.8             | lb/MMCF | (4)  | 0.26                   |
| Totals |                           |                |              |                 |         |      | 1.8                    |

**Emission Factor References:**

- (1) See Table E-3
- (2) See Table E-1
- (3) Air permit emission factors condition 33.b.ii
- (4) Air permit emission factors condition 33.b.iii

**Table E-6: PSEL Details (cont.)**

**GHG Emissions**

| EU ID         | EU Description                 | Activity Level | Units   | Emission Factor | Units    | Ref. | Annual Emissions (tpy) |
|---------------|--------------------------------|----------------|---------|-----------------|----------|------|------------------------|
| EU4           | Furnace D - Limestone Addition | 6,974          | tons/yr |                 |          | (1)  | 3068.72                |
| EU4           | Furnace D -Soda Ash Addition   | 7,262          | tons/yr |                 |          | (1)  | 3013.80                |
| EU4           | Furnace D - NG Combustion      | 242            | MMCF/yr |                 |          | (1)  | 14452.23               |
| EU4           | Duct Burner                    |                |         |                 |          | (2)  | 3846.67                |
| EU6           | Misc. Nat. Gas                 | 137.41         | MMCF/yr | 53.1148         | kg/MMBtu | (3)  | 8206.15                |
| EU7           | Boiler                         | 90.18          | MMCF/yr | 53.1148         | kg/MMBtu | (3)  | 5385.29                |
| <b>Totals</b> |                                |                |         |                 |          |      | <b>37,972.9</b>        |

Emission Factor References:

- (1) See Table E-3
- (2) See Table E-1
- (2) Emission factor from EPA, 40 CFR Part 98, Subpart C  
EU6 & EU7 natural gas usage taken from current CAO air toxics emissions inventory

**Pb Emissions**

| EU ID         | EU Description  | Activity Level | Units   | Emission Factor | Units   | Ref. | Annual Emissions (tpy) |
|---------------|-----------------|----------------|---------|-----------------|---------|------|------------------------|
| EU4           | Furnace D       |                |         |                 |         | (1)  | 0.23                   |
| EU4           | Duct Burner     |                |         |                 |         | (2)  | 0.000016               |
| EU12          | Solids Handling |                |         |                 |         | (3)  | 0.000068               |
| EU6           | Misc. Nat. Gas  | 137.41         | MMCF/yr | 0.0005          | lb/MMCF | (4)  | 0.000034               |
| EU7           | Boiler          | 90.18          | MMCF/yr | 0.0005          | lb/MMCF | (4)  | 0.000023               |
| <b>Totals</b> |                 |                |         |                 |         |      | <b>0.23</b>            |

Emission Factor References:

- (1) See Table E-3
- (2) See Table E-1
- (3) See Table E-4
- (4) ODEQ ATEI Combustion Emission Factor Tool

**Table E-7: PSEL Summary**

| EU ID           | EU Description                   | tons per year (tpy) |             |             |             |             |            |                 |             |
|-----------------|----------------------------------|---------------------|-------------|-------------|-------------|-------------|------------|-----------------|-------------|
|                 |                                  | PM10                | PM2.5       | SO2         | NOx         | CO          | VOC        | GHG             | Pb          |
| EU1 - RMBH1     | Raw Mat'l Handling - Truck       | 0.04                | 0.04        |             |             |             |            |                 |             |
| EU1/EU3 - RMBH2 | Raw Mat'l Handling - Batchhouse  | 0.04                | 0.04        |             |             |             |            |                 |             |
| EU1 Batchhouse  | Batchhouse Fugitive              | 0.03                | 0.03        |             |             |             |            |                 |             |
| EU2             | Dump to Storage/Transfer Area    | 1.92                | 0.12        |             |             |             |            |                 |             |
| EU2             | Dump to Cullet Crusher           | 0.56                | 0.03        |             |             |             |            |                 |             |
| EU2             | Dump to Railcar Loading Hopper   | 0.80                | 0.05        |             |             |             |            |                 |             |
| EU4             | Furnace D, including Duct Burner | 7.00                | 7.00        | 28.00       | 42.0        | 6.94        | 0.88       | 24381.42        | 0.23        |
| EU5 SWAB        | Mold Swab                        | 3.15                | 3.15        |             |             |             |            |                 |             |
| EU5 MBTT        | End Treat                        | 0.07                | 0.07        |             |             |             | 0.28       |                 |             |
| EU6             | Misc. Nat. Gas                   | 0.17                | 0.17        | 0.18        | 6.9         | 1.44        | 0.40       | 8206.15         | 0.000034    |
| EU7             | Boiler                           | 0.11                | 0.11        | 0.12        | 6.3         | 1.58        | 0.26       | 5385.29         | 0.000023    |
| EU10 MBD        | Mold Bench Dust Collector        | 0.29                | 0.29        |             |             |             |            |                 |             |
| EU-11           | Sorbent Silo                     | 0.00007             | 0.00007     |             |             |             |            |                 |             |
| EU-12           | Solids Handling                  | 0.00026             | 0.00026     |             |             |             |            |                 | 0.000068    |
|                 | <b>Facility Total</b>            | <b>14.2</b>         | <b>11.1</b> | <b>28.3</b> | <b>55.2</b> | <b>10.0</b> | <b>1.8</b> | <b>37,972.9</b> | <b>0.23</b> |
|                 | <b>Requested PSEL</b>            | <b>14</b>           | <b>11</b>   | <b>39</b>   | <b>55</b>   | <b>99</b>   | <b>39</b>  | <b>74,000</b>   | <b>0.5</b>  |

# **Attachment F – Safety Data Sheets**

# SAFETY DATA SHEET

Aqua Ammonia (5-19.9%)

## Section 1. Identification

**GHS product identifier** : Aqua Ammonia (5-19.9%)  
**Other means of identification** : Aqua Ammonia, Ammonium Hydroxide  
**Product use** : Synthetic/Analytical chemistry.  
**Synonym** : Aqua Ammonia, Ammonium Hydroxide  
**SDS #** : 001196  
**Supplier's details** : Airgas USA, LLC and its affiliates  
259 North Radnor-Chester Road  
Suite 100  
Radnor, PA 19087-5283  
1-610-687-5253

Manufacturer may vary based on plant selection of supplier.

**Emergency telephone number (with hours of operation)** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : SKIN CORROSION/IRRITATION - Category 1B  
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3  
AQUATIC HAZARD (ACUTE) - Category 1

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : May displace oxygen and cause rapid suffocation.  
Causes severe skin burns and eye damage.  
May cause respiratory irritation.  
Very toxic to aquatic life.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention** : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Wash hands thoroughly after handling.

**Response** : Collect spillage. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

**Date of issue/Date of revision** :

4/24/2015.

**Date of previous issue** :

4/24/2015.

**Version** : 3

1/13

## Section 2. Hazards identification

- Storage** : Store locked up.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Hazards not otherwise classified** : None known.

## Section 3. Composition/information on ingredients

- Substance/mixture** : Mixture
- Other means of identification** : Aqua Ammonia, Ammonium Hydroxide

### CAS number/other identifiers

- CAS number** : Not applicable.
- Product code** : 001196

| Ingredient name    | %         | CAS number |
|--------------------|-----------|------------|
| Aqua Ammonia       | 100       | 1336-21-6  |
| WATER              | 80.1 - 95 | 7732-18-5  |
| ammonia, anhydrous | 5 - 19.9  | 7664-41-7  |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

## Section 4. First aid measures

### Description of necessary first aid measures

- Eye contact** : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.
- Inhalation** : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in



## Section 4. First aid measures

recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes serious eye damage.
- Inhalation** : May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : Causes severe burns.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : May cause burns to mouth, throat and stomach.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
respiratory tract irritation  
coughing
- Skin contact** : Adverse symptoms may include the following:  
pain or irritation  
redness  
blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
stomach pains

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst. This material is very toxic to aquatic life. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
nitrogen oxides

## Section 5. Fire-fighting measures

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

## Section 7. Handling and storage

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name    | Exposure limits  |
|--------------------|--|
| ammonia, anhydrous | <p><b>ACGIH TLV (United States, 6/2013).</b><br/>           STEL: 24 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 35 ppm 15 minutes.<br/>           TWA: 17 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 25 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 4/2013).</b><br/>           STEL: 27 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 35 ppm 15 minutes.<br/>           TWA: 18 mg/m<sup>3</sup> 10 hours.<br/>           TWA: 25 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 2/2013).</b><br/>           TWA: 35 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 50 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b><br/>           STEL: 27 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 35 ppm 15 minutes.</p> |

**Appropriate engineering controls** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

### Skin protection

## Section 8. Exposure controls/personal protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid.
- Color** : Colorless.
- Boiling/condensation point** : Lowest known value: 38°C (100.4°F) (ammonia). Weighted average: 68.21°C (154.8°F)
- Melting/freezing point** : May start to solidify at the following temperature: 0°C (32°F) This is based on data for the following ingredient: water. Weighted average: -29.74°C (-21.5°F)
- Critical temperature** : Not available.
- Odor** : Pungent.
- Odor threshold** : Not available.
- pH** : Approx. 11.6 for 1 N Sol'n. in water
- Flash point** : Not available.
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Highest known value: 0.6 to 1.2 (Air = 1) (ammonia).
- Gas Density (lb/ft<sup>3</sup>)** : Weighted average: 0.33
- Relative density** : Not available.
- Solubility** : Not available.
- Solubility in water** : Complete
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not available.

## Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : No specific data.
- Incompatibility with various substances** : Extremely reactive or incompatible with the following materials: oxidizing materials.  
Highly reactive or incompatible with the following materials: metals.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name         | Result                            | Species    | Dose                  | Exposure     |
|---------------------------------|-----------------------------------|------------|-----------------------|--------------|
| Aqua Ammonia ammonia, anhydrous | LD50 Oral<br>LC50 Inhalation Gas. | Rat<br>Rat | 350 mg/kg<br>7338 ppm | -<br>1 hours |

#### Irritation/Corrosion

| Product/ingredient name | Result                 | Species | Score | Exposure                    | Observation |
|-------------------------|------------------------|---------|-------|-----------------------------|-------------|
| Aqua Ammonia            | Eyes - Severe irritant | Rabbit  | -     | 250<br>Micrograms           | -           |
|                         | Eyes - Severe irritant | Rabbit  | -     | 0.5 minutes 1<br>milligrams | -           |

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

#### Specific target organ toxicity (single exposure)

## Section 11. Toxicological information

| Name         | Category   | Route of exposure | Target organs                |
|--------------|------------|-------------------|------------------------------|
| Aqua Ammonia | Category 3 | Not applicable.   | Respiratory tract irritation |

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye damage.
- Inhalation** : May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : Causes severe burns.
- Ingestion** : May cause burns to mouth, throat and stomach.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:  
pain  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
respiratory tract irritation  
coughing
- Skin contact** : Adverse symptoms may include the following:  
pain or irritation  
redness  
blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
stomach pains

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

#### Long term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.

## Section 11. Toxicological information

- Teratogenicity** : No known significant effects or critical hazards.  
**Developmental effects** : No known significant effects or critical hazards.  
**Fertility effects** : No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

| Product/ingredient name         | Result                            | Species                           | Exposure |
|---------------------------------|-----------------------------------|-----------------------------------|----------|
| Aqua Ammonia ammonia, anhydrous | Acute LC50 37 ppm Fresh water     | Fish - Gambusia affinis - Adult   | 96 hours |
|                                 | Acute EC50 29.2 mg/l Marine water | Algae - Ulva fasciata - Zoea      | 96 hours |
|                                 | Acute LC50 2080 µg/l Fresh water  | Crustaceans - Gammarus pulex      | 48 hours |
|                                 | Acute LC50 0.53 ppm Fresh water   | Daphnia - Daphnia magna           | 48 hours |
|                                 | Acute LC50 300 µg/l Fresh water   | Fish - Hypophthalmichthys nobilis | 96 hours |

### Persistence and degradability

Not available.

### Bioaccumulative potential

Not available.

### Mobility in soil







- Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

- Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

- Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                                   | DOT  | TDG  | Mexico   | IMDG   | IATA   |
|-----------------------------------|--|--|--|--|--|
| <b>UN number</b>                  | UN2672   | UN2672   | UN2672   | UN2672   | UN2672   |
| <b>UN proper shipping name</b>    | Ammonium Hydroxide   | Ammonium Hydroxide   | Ammonium Hydroxide   | Ammonium Hydroxide   | Ammonium Hydroxide   |
| <b>Transport hazard class(es)</b> | 8<br>   | 8<br> | 8<br> | 8<br>  | 8<br>                 |
| <b>Packing group</b>              | III  | III  | III  | III  | III  |
| <b>Environment</b>                | No.  | No.  | No.  | Yes.   | No.  |
| <b>Additional information</b>     | <b>Reportable quantity</b><br>502.51 lbs / 228.14 kg<br>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. | -  | -  | The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.  | The environmentally hazardous substance mark may appear if required by other transportation regulations. |

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined  
**United States inventory (TSCA 8b):** All components are listed or exempted.  
**Clean Water Act (CWA) 311:** ammonia; ammonia, anhydrous  
**Clean Air Act (CAA) 112 regulated toxic substances:** ammonia, anhydrous  
**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed  
**Clean Air Act Section 602 Class I Substances** : Not listed  
**Clean Air Act Section 602 Class II Substances** : Not listed  
**DEA List I Chemicals (Precursor Chemicals)** : Not listed  
**DEA List II Chemicals (Essential Chemicals)** : Not listed  
**SARA 302/304**



**Section 15. Regulatory information****Composition/information on ingredients**

| Name               | %        | EHS  | SARA 302 TPQ |           | SARA 304 RQ |           |
|--------------------|----------|------|--------------|-----------|-------------|-----------|
|                    |          |      | (lbs)        | (gallons) | (lbs)       | (gallons) |
| ammonia, anhydrous | 5 - 19.9 | Yes. | 500          | -         | 100         | -         |

**SARA 304 RQ** : 502.5 lbs / 228.1 kg

**SARA 311/312**

**Classification** : Immediate (acute) health hazard

**Composition/information on ingredients**

| Name                               | %               | Fire hazard | Sudden release of pressure | Reactive   | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|------------------------------------|-----------------|-------------|----------------------------|------------|---------------------------------|---------------------------------|
| Aqua Ammonia<br>ammonia, anhydrous | 100<br>5 - 19.9 | No.<br>Yes. | No.<br>Yes.                | No.<br>No. | Yes.<br>Yes.                    | No.<br>No.                      |

**SARA 313**

|  | Product name                  | CAS number             | %               |
|--|-------------------------------|------------------------|-----------------|
| <b>Form R - Reporting requirements</b> | ammonia<br>ammonia, anhydrous | 1336-21-6<br>7664-41-7 | 100<br>5 - 19.9 |
| <b>Supplier notification</b>           | ammonia<br>ammonia, anhydrous | 1336-21-6<br>7664-41-7 | 100<br>5 - 19.9 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

**State regulations**

- Massachusetts** : The following components are listed: AMMONIUM HYDROXIDE; AMMONIA
- New York** : The following components are listed: Ammonium hydroxide; Ammonia
- New Jersey** : The following components are listed: AMMONIUM HYDROXIDE; AMMONIA
- Pennsylvania** : The following components are listed: AMMONIUM HYDROXIDE ((NH<sub>4</sub>)(OH)); AMMONIA

**Canada inventory** : All components are listed or exempted.

**International regulations**

- International lists** :
- Australia inventory (AICS)**: All components are listed or exempted.
  - China inventory (IECSC)**: All components are listed or exempted.
  - Japan inventory**: All components are listed or exempted.
  - Korea inventory**: All components are listed or exempted.
  - Malaysia Inventory (EHS Register)**: Not determined.
  - New Zealand Inventory of Chemicals (NZIoC)**: All components are listed or exempted.
  - Philippines inventory (PICCS)**: All components are listed or exempted.
  - Taiwan inventory (CSNN)**: Not determined.

**Chemical Weapons Convention List Schedule I Chemicals** : Not listed

**Chemical Weapons Convention List Schedule II Chemicals** : Not listed

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

## Section 15. Regulatory information

- Canada**
- WHMIS (Canada)** : Class D-1A: Material causing immediate and serious toxic effects (Very toxic).  
Class E: Corrosive material
- CEPA Toxic substances:** The following components are listed: Ammonia dissolved in water
- Canadian ARET:** None of the components are listed.
- Canadian NPRI:** The following components are listed: Ammonia (total); Ammonia (total)
- Alberta Designated Substances:** None of the components are listed.
- Ontario Designated Substances:** None of the components are listed.
- Quebec Designated Substances:** None of the components are listed.

## Section 16. Other information

- Canada Label requirements** : Class D-1A: Material causing immediate and serious toxic effects (Very toxic).  
Class E: Corrosive material

### Hazardous Material Information System (U.S.A.)

|                  |   |
|------------------|---|
| Health           | 3 |
| Flammability     | 0 |
| Physical hazards | 0 |
|                  |   |

**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.**

The customer is responsible for determining the PPE code for this material.

### National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

- Date of printing** : 4/24/2015.
- Date of issue/Date of revision** : 4/24/2015.
- Date of previous issue** : 4/24/2015.
- Version** : 3

## Section 16. Other information

### Key to abbreviations

- : ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations
- ACGIH – American Conference of Governmental Industrial Hygienists
- AIHA – American Industrial Hygiene Association
- CAS – Chemical Abstract Services
- CEPA – Canadian Environmental Protection Act
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
- CFR – United States Code of Federal Regulations
- CPR – Controlled Products Regulations
- DSL – Domestic Substances List
- GWP – Global Warming Potential
- IARC – International Agency for Research on Cancer
- ICAO – International Civil Aviation Organisation
- Inh – Inhalation
- LC – Lethal concentration
- LD – Lethal dosage
- NDSL – Non-Domestic Substances List
- NIOSH – National Institute for Occupational Safety and Health
- TDG – Canadian Transportation of Dangerous Goods Act and Regulations
- TLV – Threshold Limit Value
- TSCA – Toxic Substances Control Act
- WEEL – Workplace Environmental Exposure Level
- WHMIS – Canadian Workplace Hazardous Material Information System

### References

- : Not available.

▣ Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Sorbent type and anufacturer may vary based on plant selection of supplier.

**SECTION 1: PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** Sorbacal® SP  
**Synonym/s:** Hydrate; High Calcium Hydrated Lime; HL  
**Chemical Name:** Calcium hydroxide **Chemical Formula:** Ca(OH)<sub>2</sub>  
**Product Use/s:** FGT, Water treatment, pH adjustment, Construction

|                      |   |   |
|----------------------|---|---|
| <b>Manufacturer:</b> | <b>US Operations:</b><br>Lhoist North America<br>3700 Hulen St.<br>Fort Worth, TX 76107<br>817-732-8164 | <b>Canadian Operations:</b><br>Lhoist North America of Canada, Inc.<br>20303-102B Ave.<br>Langley, BC V1M 3H1<br>604-888-4333 |
|----------------------|---|---|

**Emergency Phone:** Chemtrec 1-800-424-9300

**SECTION 2: HAZARDS IDENTIFICATION**

**Emergency Overview:** Sorbacal® SP is an odorless white powder. Contact can cause irritation to eyes, skin, respiratory system, and gastrointestinal tract.

**Hazard Pictograms:**



**Potential Health Effects**

- Eyes:** Contact can cause severe irritation or burning of eyes, including permanent damage.
- Skin:** Contact can cause severe irritation or burning of skin, especially in the presence of moisture.
- Ingestion:** This product can cause severe irritation or burning of gastrointestinal tract if swallowed.
- Inhalation:** This product can cause severe irritation of the respiratory system. Long-term exposure may cause permanent damage. Sorbacal® SP is not listed by MSHA, OSHA, or IARC as a carcinogen. However, this product may contain trace amounts of crystalline silica in the form of quartz or cristobalite, which has been classified by IARC as a Group I carcinogen to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

**Potential Environmental Effects:** This material is alkaline and if released into water or moist soil will cause an increase in pH.

**SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS**

| Ingredient         | Chemical Formula    | Common Name   | Conc. (%) | CAS        |
|--------------------|---------------------|---------------|-----------|------------|
| Calcium Hydroxide  | Ca(OH) <sub>2</sub> | Hydrated Lime | > 90      | 1305-62-0  |
| Magnesium Oxide    | MgO                 | Periclase     | < 3       | 1309-48-4  |
| Calcium Carbonate  | CaCO <sub>3</sub>   | Limestone     | < 3       | 1317-65-3  |
| Crystalline Silica | SiO <sub>2</sub>    | Quartz        | < 2       | 14808-60-7 |

(Crystalline Silica is reported as total silica and not just the respirable fraction)

**SECTION 4: FIRST AID MEASURES**

|   |  |
|---|--|
| <b>Eyes:</b>                                      | Immediately flush eyes with generous amounts of water or eye wash solution if water is unavailable. Pull back eyelid while flushing to ensure that all Sorbacal® SP dust has been washed out. Seek medical attention promptly if the initial flushing of the eyes does not remove the irritant. Do not rub eyes. |
| <b>Skin:</b>                                      | Brush off or remove as much Sorbacal® SP as possible. Wash exposed area with large amount of water. If burned seriously or if irritation persists, seek medical attention promptly.  |
| <b>Inhalation:</b>                                | Move victim to fresh air. Seek medical attention. If breathing has stopped, give artificial respiration.   |
| <b>Ingestion:</b>                                 | Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.  |
| <b>Medical Conditions Aggravated by Exposure:</b> | Contact may aggravate disorders of the eyes, skin, gastrointestinal tract, and respiratory system.   |

**SECTION 5: FIREFIGHTING MEASURES**

|                                       |   |
|---------------------------------------|---|
| <b>Fire Hazards:</b>                  | Sorbacal® SP is not combustible or flammable. However, it reacts vigorously with acids, and may release heat sufficient to ignite combustible materials in specific instances. Sorbacal® SP is not considered to be an explosion hazard, although reaction with acids or other incompatible materials may rupture containers. |
| <b>Suitable Extinguishing Media:</b>  | Use dry chemical or CO <sub>2</sub> fire extinguisher to extinguish the surrounding fire.   |
| <b>Fire Fighting Instructions:</b>    | Keep personnel away from and upwind of fire. Avoid skin contact or inhalation of dust. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).   |
| <b>Hazardous Combustion Products:</b> | Not applicable  |

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

|                                 |   |
|---------------------------------|---|
| <b>Spill / Leak Procedures:</b> | <b>Do Not</b> use water on bulk material spills.<br>Use proper personal protective equipment.   |
| <b>Small Spills:</b>            | Use dry methods to collect spilled materials. Avoid generating dust. Do not clean up with compressed air. Store collected materials in dry, sealed plastic or non-aluminum metal containers. Residue on surfaces may be water washed. |
| <b>Large Spills:</b>            | Use dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or non-aluminum metal containers.                               |
| <b>Containment:</b>             | Minimize dust generation and prevent bulk release to sewers or waterways.   |
| <b>Clean-up:</b>                | Residual amounts of material can be flushed with large amounts of water. Equipment can be washed with either a mild vinegar and water solution, or detergent and water.   |

**SECTION 7: HANDLING AND STORAGE**

|                  |  |
|------------------|--|
| <b>Handling:</b> | Keep in tightly closed plastic or non-aluminum metal containers. Protect containers from physical damage. Avoid direct skin contact with the material. Avoid breathing any dust.   |
| <b>Storage:</b>  | Store in a cool, dry, and well-ventilated location. Do not store near acids or other incompatible materials. Keep away from moisture. Do not store or ship in aluminum containers. |

**SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**

| Ingredient         | OSHA PEL,<br>TWA 8/40h<br>(mg/m3)           | ACGIH TLV,<br>TWA 8/40h<br>(mg/m3) | NIOSH REL,<br>TWA 8/40h<br>(mg/m3) | NIOSH IDLH<br>(mg/m3) |
|--------------------|---|------------------------------------|------------------------------------|-----------------------|
| Calcium Hydroxide  | 15 (total dust)<br>5 (respirable)           | 5                                  | 5                                  | n/a                   |
| Magnesium Oxide    | 10  | 10                                 | n/a                                | n/a                   |
| Calcium Carbonate  | 15 (total dust)<br>5 (respirable)           | 10                                 | 10 (total dust)<br>5 (respirable)  | n/a                   |
| Crystalline Silica | 10/(SiO <sub>2</sub> % +<br>2) (respirable) | 0.025<br>(respirable)              | 0.05<br>(respirable)               | 50                    |

**Engineering Controls:** Provide ventilation adequate to maintain PELs.

**Respiratory Protection:** Use NIOSH/MSHA approved respirators if airborne concentration exceeds PELs.

**Skin Protection:** Use appropriate gloves and footwear to prevent skin contact and the potential for burns. Clothing should fully cover arms and legs. Should lime get inside clothing or gloves, remove the clothing and the lime promptly.

**Eye Protection:** Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.

**Other:** Eye wash fountain/stations and emergency showers should be available.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

|  |  |                                     |
|--|--|-------------------------------------|
| <b>Appearance:</b> White free flowing powder                               | <b>Odor:</b> Odorless  | <b>Physical State:</b> Solid        |
| <b>Melting Point (°C/°F):</b> dec 580/ 1076                                | <b>Boiling Point (°C/°F):</b> n/a  | <b>Bulk Density:</b> 25-32 lbs/ ft3 |
| <b>Specific Gravity</b> (Apparent) g/cc: 0.4 - 0.55 (True) g/cc: 2.2 - 2.4 |  |                                     |
| <b>Vapor Pressure (mm Hg):</b> n/a   | <b>Vapor Density:</b> n/a  | <b>Evaporation Rate:</b> n/a        |
| <b>pH (25°C/77°F):</b> 12.4  | <b>Solubility in Water:</b> Slightly soluble in water at 1.02 g/L at 25 °C |                                     |

**SECTION 10: STABILITY AND REACTIVITY**

**Stability:** Chemically stable, but slowly reacts with CO<sub>2</sub> to form calcium carbonate. See also Incompatibility below.

**Hazardous Decomposition/ Products:** Does not occur

**Hazardous Polymerization:** Does not occur

**Incompatibility/ Conditions to Avoid:** Sorbacal® SP should not be mixed or stored with the following materials, due to the potential for vigorous reaction and release of heat:

|  |                                |
|--|--------------------------------|
| Acids (unless in a controlled process) | Organic Acid Anhydrides        |
| Reactive Fluoridated Compounds         | Nitro-Organic Compounds        |
| Reactive Brominated Compounds          | Reactive Phosphorous Compounds |
| Reactive Powdered Metals               | Interhalogenated Compounds     |

**SECTION 11: TOXICOLOGICAL INFORMATION**

ORL-RAT LD50: 7,340 MG/KG

ORL-MUS LD50: 7,300 MG/KG

Sorbacal® SP is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product may contain trace amounts of crystalline silica, which has been classified by IARC as carcinogenic to humans when inhaled in the form of quartz or cristobalite.

Inhalation, skin and eye contact are the most likely routes of exposure. This material is irritating to the skin and severely irritating to the eyes.

## SECTION 12: ECOLOGICAL INFORMATION

- Ecotoxicity:** Because of the high pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems in high concentrations (> 1 g/L).
- Environmental Fate:** This material shows no bioaccumulation effect or food chain concentration toxicity. High pH values will rapidly decrease over time as a result of recarbonation. This material may be used in soil stabilization or remediation and will show very little mobility in soils.

## SECTION 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable federal, state, and local environmental regulations. If this product as supplied, and unmixed, becomes a waste, it will not meet the criteria of a hazardous waste as defined under the U.S. Resource Conservation and Recovery Act (RCRA).

## SECTION 14: TRANSPORTATION INFORMATION

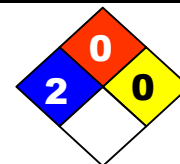
Sorbacal® SP is not classified as a hazardous material by US DOT and is not regulated by the Transportation of Dangerous Goods (TDG) when shipped by any mode of transport.

## SECTION 15: REGULATORY INFORMATION

- U.S. EPA Regulations:** RCRA Hazardous Waste Number (40 CFR 261.33): not listed  
RCRA Hazardous Waste Classification (40 CFR 261): not classified  
CERCLA Hazardous Substance (40 CFR 302.4) unlisted specific per RCRA, Sec. 3001;  
CWA, Sec. 311(b)(4); CWA, Sec. 307(a), CAA, Sec. 112  
CERCLA Reportable Quantity (RQ), not listed  
SARA 311/312 Codes: not listed  
SARA Toxic Chemical (40 CFR 372.65): not listed  
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): not listed, Threshold Planning Quantity (TPQ): not listed  
All chemical ingredients are listed on the US EPA TSCA Inventory List.
- OSHA/MSHA Regulations:** Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): 5mg/M<sup>3</sup> TWA-8  
MSHA: not listed  
OSHA Specifically Regulated Substance (29 CFR 1910): not listed
- State Regulations:** Consult state and local authorities for guidance. Components found in this product may contain trace amounts of inherent naturally occurring elements (such as, but not limited to arsenic and cadmium) that may be regulated under California Proposition 65 and other States regulations.
- Canada:** WHMIS Classification: "D2A" Materials Causing Other Toxic Effects  
WHMIS Classification: "E" Corrosive Materials (listed due to corrosive effect on aluminum)  
Canada DSL: Listed

**SECTION 16: OTHER INFORMATION**

**Prepared By:** Lhoist North America, Technical Services  
**Date Prepared:** August 6, 2012 **Revision:** 2012-2



**NFPA Hazard Class:** Health: 2 Flammability: 0 Instability: 0

**HMIS Hazard Class:** Health: 2\* Flammability: 0 Hazard: 0 Physical Personal Protection: E

**Abbreviations:**  
N/A Not Available or Not Applicable  
IARC International Agency for Research on Cancer  
IATA International Air Transport Association  
ACGIH American Conference of Governmental Industrial Hygienists  
TWA Time Weighted Average  
PEL Permissible Exposure Limit  
TLV Threshold Limit Value  
REL Recommended Exposure Limit  
dec Decompose

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