REQUEST FOR SIGNIFICANT PERMIT REVISION TO AIR QUALITY CONTROL PERMIT NO. 93430 (BIOMASS PROJECT)

Submitted to:
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Submitted By:

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Prepared By:

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 PROJECT DESCRIPTION 2
2.1 Biomass Source Description 2
2.2 Proposed Project 2
2.3 Proposed Process - Material Feeding and Storage 3
3.0 EMISSION CALCULATIONS 5
3.1 Emissions Net Potential to Emit Increase and Significance Analysis 5
3.2 Impacts Analysis 6
4.0 REGULATORY APPLICABILITY 7
4.1 AAC Title 18, Chapter 2 7
4.2 40 CFR Part 63 Subpart A and Subpart LLL 7

TABLES

Table 1 Proposed Project Potential to Emit Summary
Table 2 List of Proposed New Affected Sources
Table 3 Equipment List
Table 4 40 CFR Part 63 Subpart A and Subpart LLL Summary of Applicable Requirements

APPENDICES

Appendix 1 Standard Permit Application Form and Certification of Truth, Accuracy and Completeness
Appendix 2 Compliance Plan and Compliance Certification
Appendix 3 Emission Calculations Tables
Appendix 4 Revised Proposed Process Flow Drawings
Appendix 5 Supporting Documents

1.0 INTRODUCTION

Drake Cement, LLC (Drake) is submitting this significant permit revision application to the Arizona Department of Environmental Quality (ADEQ) for revision of Air Quality Control Permit Number 93430. As part of Drake's commitment to sustainability efforts, Drake is looking to add an alternative fuel system to introduce biomass as a fuel source to offset coal and pet coke consumption in the cement manufacturing process. The purpose of this significant permit revision is to incorporate the proposed process equipment which will feed biomass to the existing kiln calciner and amend the existing Drake Air Quality Control Permit to allow for use of this alternative fuel in the process. The application includes potential increases in emissions of PM, PM_{10} and $PM_{2.5}$. The use of biomass as an alternative to coal and pet coke is expected to significantly reduce carbon based emissions and potentially lower SO2 emissions in the process. No increase of other regulated pollutants of NO_X, CO, VOC and SO_2 emissions is anticipated as part of this permit revision. Drake utilizes continuous emissions monitoring for these pollutants and will continue to operate withing the existing emission limits for NO_X, CO, VOC and SO_2 as well as existing federal limits for HCl and mercury.

This application contains the technical report, which forms the basis for this application for a significant permit revision. Section 1.0 is the introduction. Section 2.0 provides a description of the proposed revision. Section 3.0 contains the calculations of the net emissions increases for the proposed project and provides an analysis of the predicted impacts resulting from the project. Section 4.0 provides a summary of regulatory applicability. The completed Standard Permit Application Form and Certification of Truth, Accuracy and Completeness are included in Appendix 1. Appendix 2 contains a Compliance Plan and Compliance Certification. Appendix 3 contains the emissions calculations and summary of emissions for the proposed project. Appendix 4 provides updated process flow design drawings showing the proposed equipment for the project. Appendix 5 contains the technical specifications supporting documentation for the project.

2.0 PROJECT DESCRIPTION

Drake, as a part of the sustainability commitment, is proposing to install an alternative fuel system. This new alternative fuel system will have 2 stages. The first stage proposed is the Biomass system which consists of the installation of a pneumatic system to directly feed the calciner with wood chips, and blend sawdust within the existing coal and pet coke process to feed the kin and calciner. The second stage of the system will involve a storage center to feed the calciner with different alternative fuels such as tires, plastics, organic fuels, and wood. This permit revision proposes to include only the first stage, feeding the calciner with wood chips and blending sawdust with the existing coal and pet coke processes.

2.1 Biomass Source Description

Drake has recently secured a source of biomass that will be recovered from the Drake Pronghorn Corridor Project Phase 1. This project has also received a letter of support from Prescott National Forest to allow and provide administrative means to remove biomass from the project area to be utilized by Drake Cement. With the support of Prescott National Forest and the project award through Arizona Game and Fish, Drake has successfully secured a supply of biomass to move forward with an alternative fuels system at the plant.

Drake is also collaborating with contractors who are negotiating with the Kaibab National Forest to purchase the trees they have cut and piled in their own projects. The supply contractor also has commitments for material from both State and private lands in the Paulden area. These agreements and diverse portfolio of sources will allow for a stream of biomass to be used at the Drake Cement Plant. The proposed project will utilize woods chips and sawdust recovered from these sources to decrease energy costs and offset the use of coal and pet coke while restoring wildlife habitat and improving watersheds in central Arizona.

2.2 Proposed Project

The project will be designed to be able to provide a total replacement of the traditional fuel used in the calciner (mix coal - coke) with wood chips in a progressive way. The forecasted fuel replacement will be performed starting with replacing 10- 20% of mixed coal-coke with biomass and increasing initially until 50% replacement is achieved by the end of 2024. It is anticipated that up to 100% replacement of the mixed coal-coke can be achieved by January of 2025. Below is the proposed schedule for coal-coke replacement with biomass.

		2024						2025
		Jul	Aug	Sep	Oct	Nov	Dec	Month
Material	**%replacement**	**0%**	**10%**	**20%**	**20%**	**20%**	**50%**	**100%**
Woodchips	stph	-	0.59	1.18	1.18	1.18	2.95	5.90
Coal-Coke	stph	4.10	3.69	3.28	3.28	3.28	2.05	-

The design values of the Biomass system were obtained by taking the 2023 fuel consumption data, excluding non-representative months due to kiln down events.

Based on the fuel consumption assessment the coal-coke pulverized mix in the calciner was on average 2,950 tons per month. Converting this value to heat consumption (11,810 BTU/lb per mix coal-coke) this is equivalent to 69,679 MMBTU per month, therefore the biomass project must supply feed to the calciner with an equivalent heat value using wood chips.

Based on representative source testing and laboratory analysis, the biomass material has a heat value of 8200 BTU/lb. and a density of 15 pounds per cubic foot. According to the characteristics of the wood chips and fuel requirements, for 100% replacement of coal-coke pulverized mix in the calciner, Drake will need to feed approximately 4,248 tons per month of wood chips, which is equivalent to 5.9 tons per hour.

Replacement percentage	Fuel consumption	Heat value wood	Wood feed rate to Calciner
%	BTU/hr	BTU/lb	Stph
10%	9,674,721	8200	0.6
20%	19,349,443	8200	1.2
50%	48,373,607	8200	2.9
100%	96,747,214	8200	5.9

REMARK: *the max design capacity is 5.9 tons/hr.*

In addition, a portion of the wood chips as sawdust may be collected and blended with existing coal and pet coke. Sawdust from the project would be introduced into the existing process, blended with coal and coke and utilized as additional fuel within the kiln and calciner.

2.3 Proposed Process - Material Feeding and Storage

The proposed biomass source will be processed off-site. Wood chips and sawdust will be brought to the site using assumed 20-ton highway haul trucks and stockpiled on the south side of the kiln calciner or within the existing material storage building with coal and pet coke. Stockpiled wood chips will be delivered to a feed hopper using a front end loader, and pneumatically blown into the calciner near where the existing pulverized coal and coke mix is introduced. Sawdust would be stored and blended with coal and coke within the existing operations at the material storage building. The following provides a description of the proposed biomass system areas and associated new process equipment:

Storage Pile:

The storage will have a capacity of 9,100 cubic feet equivalent to approximately 68 tons, with dimensions 100' x 20' plan view at 45 degrees angle to repose. The proposed stockpile volume for the system can work approximately 12 hours continuously in the scenario that Drake replaces 100% of existing fuel in the calciner.

Feeding Hopper:

Biomass will be fed with a wheel loader such as CAT 966 or bigger. The hopper will have a capacity of 20 cubic yards. With this capacity the system can operate for approximately 40 minutes, before being fed again.

Twin Screw Feeder:

The feeding hopper includes a dosing twin-screw feeder installed at the bottom, and the screw feeders will be equipped with a Variable Frequency Drive (VFD) allowing control of the flow of wood chip feeding to the calciner.

Screw conveyor – collector:

The screw conveyor will be loaded from the twin screw feeder and unloaded to a rotary valve, this screw conveyor will have a scale control system to weigh and control the material dosing on the twin screw feeders through the VFD and integrated control system.

Rotary valve:

The rotary valve will feed the pneumatic pipe, designed exclusively for feeding wood chips. The rotary valve will be sealed to connect with the pneumatic pipe.

Blower:

A blower (AERZEN GM80L or equivalent) will be utilized for conveying up to 5.9 tons/hr. which is equivalent to replacing up to 100% of mixed coal - coke fuel.

Pipeline:

The biomass system will use an existing 8 inch diameter pneumatic pipe installed on-site.

Control and automation:

To be supplied by competent suppliers such as Siemens, ABB, Rockwell or equivalent.

The transfer of material after the feed hopper will be through enclosed screw conveyors and a pneumatic transfer system into the calciner. Only fugitive emissions resulting from the transfer and storage of wood chips are proposed for the project.

3.0 EMISSION CALCULATIONS

3.1 Emissions Net Potential to Emit Increase and Significance Analysis

This section describes the calculations of potential to emit (PTE), and the resulting potential emissions increase under the existing permit.

Emissions calculations for the proposed project are based on the Technical Specification for Biomass Project Revision A dated January 19, 2024. Feed material will be brought onto the site using assumed 20-ton haul trucks which will unload and stockpile wood chips adjacent to the kiln calciner. Sawdust may also be brought in and stored in the existing material storage building where it would be blended with coal and pet coke utilizing the existing process equipment. Potential fugitive emissions of particulate matter may result for the transfer and storage of wood chips to the storage pile and from the loader transfer of wood chips into the feed hopper which supplies feed that is metered and pneumatically blown into the calciner. The remaining portions of the proposed process involve enclosed pneumatic metering and transfer of wood chips into the calciner. There are no additional point sources of particulate emissions within the proposed process after the feed hopper.

The combustion process results in emissions of regulated gaseous pollutants. Based on research and studies, pyroprocessing systems in the cement industry are ideally suited to utilize biomass as an alternative fuel. The extremely high temperature and long residence time allow for complete combustion of biomass fuels within these systems. Biomass fuels are considered to provide energy with near net-zero carbon based emissions. Overall biomass as an alternative fuel to coal-coke mixes in the cement kiln is expected to significantly reduce carbon based emissions and potentially lower SO_2 emissions.[1] No appreciable difference or increase in other regulated pollutants is anticipated with utilizing biomass in lieu of traditional coal or pet coke fuels. Drake currently has permitted emission limits for all regulated pollutants which are continuously monitored through CEMS at the site. The proposed project will continue to comply with existing emission limits for all regulated pollutants within the existing air quality permit.

The operating throughput and schedule for the proposed source is conservatively estimated at a maximum of 6 tons per hour of biomass introduced into the process and 8,760 hours per year of operation for purposes of calculating potential emissions. Emission calculations are provided for the proposed project fugitive sources of emissions in Appendix C.

As shown in the following table, the potential emissions resulting from the proposed project are

[1] William T. Choate, *Energy and Emission Reduction Opportunities for the Cement Industry,* 2003, p. ii, pp. 26-27.

below the significant thresholds for each applicable pollutant.

Table 1 – Proposed Project Potential to Emit Summary

Pollutant	Project Potential Emissions (tpy)	Significant Threshold (tpy)
PM	0.96	25
PM_{10}	0.56	15
$PM_{2.5}$	0.43	10

3.2 Impacts Analysis

As seen in Table 1 above and discussed in Section 3.1, the post project potential emissions do not trigger Minor or Major NSR. Overall the project will result in a minor increase in fugitive emissions resulting from the transfer and storage of biomass, but in turn is anticipated to reduce carbon based emissions from the combustion process.

In addition, Drake continues to monitor ambient air at monitoring locations at the plant and near the boundary of Sycamore Canyon. Ambient air data collected shows current levels of background and any contribution from the plant to be well below the NAAQS. Based on this assessment and continued monitoring conducted, the proposed project will not have a significant impact on air quality or interfere with attainment and maintenance of the NAAQS.

4.0 REGULATORY APPLICABILITY

4.1 AAC Title 18, Chapter 2

The proposed permit revision is not a major modification to the existing plant. The proposed emissions increase is not significant as defined under R-18-2 101. As such, the requirements under A.A.C. Title 18, Chapter 2 Article 4 are not applicable.

The proposed permit revision will not result in a modification or significant increase of any regulated HAP. As such, the requirements covered under A.A.C. Title 18, Chapter 2 Article 17 are not applicable.

The proposed process must be processed as a significant permit revision in accordance with R-18-2-319.A.6. which does not allow for minor permit revision procedures since the proposed modification represents a change in fuels not provided for in the permit. Currently the Drake permit only allows for coal, petroleum coke, and natural gas as fuels for the process. The proposed permit application requests to include biomass as an alternative fuel in the process.

A.A.C. Title 18, Chapter 2 Article 11 incorporates by reference the requirements under the Federal National Emission Standards for Hazardous Air Pollutants (NESHAPs) of which R-18-2-1101(B)(1) and R-18-2-1101(B)(50) corresponding to 40 CFR Part 63 Subpart A – General Provisions and 40 CFR Part 63 Subpart LLL – NESHAPs from the Portland Cement Manufacturing Industry are applicable. These requirements pertaining to the proposed plant modification are outlined in the following section.

4.2 40 CFR Part 63 Subpart A and Subpart LLL

The Drake facility is a Portland cement plant and a major source as defined in 40 CFR 63.2, and therefore is subject to the provisions of Subpart LLL of 40 CFR 63, National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry. Affected sources include each:

- kiln and in-line kiln/raw mill,
- coal mill (commingled with kiln exhaust)
- clinker cooler,
- raw mill,
- finish mill,
- raw material dryer,

- raw material, clinker, or finished product storage bin,
- conveying system transfer point,
- bulk loading or unloading system.

The first affected source subject to Subpart LLL, in the sequence of materials handling operations, is the raw material storage, which is just prior to the raw mill. The first conveyor transfer point subject to this subpart is the transfer point associated with the conveyor transferring material from the raw material storage to the raw mill. Table 2 provides the list of proposed applicable affected sources that will be added as part of this permit revision. Table 3 provides information on proposed equipment to be added to the current permit equipment list. A summary of the applicable requirements under 40 CFR Subpart A and Subpart LLL applicable to the sources covered under this permit revision is provided in Table 4.

TABLE 2

LIST OF PROPOSED NEW AFFECTED SOURCES

TABLE 2

LIST OF PROPOSED NEW AFFECTED SOURCES

FINISH MILLS, STORAGE BINS, BULK LOADING AND UNLOADING SYSTEMS, AND CONVEYING SYSTEM TRANSFER POINTS SUBJECT TO 40 CFR 63 SUBPART LLL

Emission Unit/Affected Source Name (Equipment ID Number)	Emission Unit/ Affected Source Description	Control Measure (Control Device ID Number)	Emission Point ID Number
Biomass Feed System			
Feed Hopper (444.01.FH)	Batch Drop, 6 tons per hour	None	444.01.FH
Twin Screw Feeder – Bottom of Feed Hopper (444.05.SV)	Transfer Point, 6 tons per hour	Enclosed	444.05.SV
Screw Conveyor Collector (444.10.SV)	Transfer Point, 6 tons per hour	Enclosed	444.10.SV
Single Idler Crew Scale for Screw Conveyor Collector (444.10.BS01)	Transfer Point, 6 tons per hour	Enclosed	444.10.BS01
Rotary Valve (444.15.RV)	Transfer Point, 6 tons per hour	Enclosed	444.15.RV
Air Compressor (444.20.SC)	Transfer Point, 1,900 scfm	None	N/A
Pneumatic conveying pipe to calciner (444.20.PC01)	Transfer Point, 8 inch - 6 tons per hour	Enclosed	444.20.PC01
Motorized Slide gate (444.20.MG02)	Transfer Point, 6 tons per hour	Enclosed	444.20.MG02

TABLE 3

EQUIPMENT LIST

EQUIPMENT LIST (Changes to Final Equipment List Description Highlighted in Yellow, Equipment list provided contains equipment to be added to the permit equipment list under Department 12)

Equipment ID	Equipment Description	Capacity	Make	Model Number	Serial Number	Date of Mfg
Department 12 - Coal Grinding System with Baghouse, Pulverized Coal Silo and Coal Distribution System, and Biomass Feed System for Kiln and Calciner						
444.01.FH	Feeding Hopper	6 tph		TBD	TBD	2024
444.05.SV	Twin Screw Feeder	6 tph		TBD	TBD	2024
444.10.SV	Screw Conveyor Collector	6 tph		TBD	TBD	2024
444.10.BS01	Single Idler Screw Scale	6 tph		TBD	TBD	2024
444.15.RV	Rotary Valve	6 tph		TBD	TBD	2024
444.20.SC	Air Compressor	1,900 scfm		TBD	TBD	2024
444.20.PC01	Pneumatic Conveying Pipe to Calciner	8 inch - 6 tph		TBD	TBD	2024
444.20.MG02	Motorized Slide Gate	6 tph		TBD	TBD	2024

TABLE 4

40 CFR Part 63 Subpart A and Subpart LLL Summary of Applicable Requirements

40 CFR Part 63 Subpart A and Subpart LLL Summary of Applicable Requirements

Rule Section Citation	Summary of Requirements	Comment
40 CFR Part 63 Subpart A	General Provisions	Drake will comply with the general applicable provisions under this subpart as outlined in the current permit.
§ 63.1345	Establishes 10% opacity limit for affected sources	Drake will comply with the 10% opacity limit as outlined in the current permit.
§ 63.1347(a)	Requires the and O&M Plan be prepared and followed for affected sources	The proposed project will not include any new air pollution control devices. Existing O&M plan procedures will be followed to ensure proper operation and maintenance of the system.
§ 63.1350(f)	Requirements for visible emissions observations	Drake will comply with the visible emissions observations required under this section as outlined in the current permit.
§ 63.1355(a)	Requirement for maintaining records	Drake will maintain records as required under this section and outlined in the current permit.
§ 63.1355(b)	Establishes recordkeeping requirements for affected sources	Drake will comply with the recordkeeping required under this section as outlined in the current permit.
§ 63.1343(b)	Establishes emission limits for affected sources	Drake will comply with the emission limits established under this section as outlined in the current permit.
§ 63.1349(a)	Outlines requirements for performance test plan, reports, and procedures	Drake will comply with the performance test plan, reports and procedures under this section as outlined in the current permit.
§ 63.1348(a)(2) and § 63.1349(b)(2)	Establishes opacity performance test requirements for affected sources	Drake will comply with the opacity performance testing requirements as outlined in the current permit.

APPENDIX 1

Standard Permit Application Form and Certification of Truth, Accuracy and Completeness

SECTION 2.1

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division

1110 West Washington • Phoenix, AZ 85007 • Phone: (602) 771-2338

STANDARD CLASS I PERMIT APPLICATION FORM

(As required by A.R.S. § 49-426, and Chapter 2, Article 3, Arizona Administrative Code)

1. Permit to be issued to (Business license name of organization that is to receive permit):
   Drake Cement, LLC

2. Mailing Address: 21803 N. Scottsdale Rd., Suite 220
   City: Scottsdale State: AZ ZIP: 85255

3. Name (or names) of Owners/ Principals: Enrique Rozas, CEO & President
   Phone: 480.219.6670 Fax: 480.282.9046 Email: erozas@drakeus.com

4. Name of Owner's Agent: Scott Blanset
   Phone: 928.636.6004 Fax: 928.636.4825 Email: sblanset@drakeus.com

5. Plant/Site Manager/ Contact Person and Title: Scott Blanset
   Phone: 928.636.6004 Fax: 928.636.4825 Email: sblanset@drakeus.com

6. Plant Site Name: Drake Cement Plant

7. Plant Site Location Address: 5001 East Drake Road
   City: Paulden County: Yavapai Zip Code: 86334
   Indian Reservation (if applicable, which one): N/A
   Latitude/ Longitude, Elevation: 34°58'51" N 112°22'33" W, elevation 4660 ft
   Section/ Township/ Range: SW $^{1}/_{4}$ Section 33 / Township 19 North / Range 1 West

8. General Nature of Business: Portland Cement Manufacturing

9. Type of Organization:
   ☐ Corporation ☐ Individual Owner ☐ Partnership ☐ Government Entity (Government Facility Code----------)
   x ☐ Other LLC

8. Permit Application Basis: ☐ New Source x Revision ☐ Renewal of Existing Permit
   (Check all that apply.)
   For renewal or modification, include existing permit number (and exp. date): Permit #93430 Exp. August 16, 2027
   Date of Commencement of Construction or Modification: July 2024
   Primary Standard Industrial Classification Code: 3241

9. I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by ADEQ as public record. I also attest that I am in compliance with the applicable requirements of the Permit and will continue to comply with such requirements and any future requirements that become effective during the life of the Permit. I will present a certification of compliance to ADEQ no less than annually and more frequently if specified by ADEQ. I further state that I will assume responsibility for the construction, modification,

or operation of the source in accordance with Arizona Administrative Code, Title 18, Chapter 2 and any permit issued thereof.

Signature of Responsible Official: DocuSigned by: Enrique Rozas 3EEBF0751E8C45F...

Official Title of Signer: CEO & President

Typed or Printed Name of Signer: Enrique Rozas

Date: 4/25/2024 Telephone Number: 480.219.6670

APPENDIX 2

Compliance Plan and Compliance Certification

COMPLIANCE PLAN

This Compliance Plan is included in this application for a significant permit revision to meet the requirements of A.A.C. R18-2-304(B), which requires submittal of all information required by "Filing Instructions" as shown in Appendix 1 of A.A.C. Title 18. Appendix 1 of Title 18 includes a requirement that a Compliance Plan be supplied with the application. The Compliance Plan must include:

- A description of the compliance status of the source with respect to all applicable requirements,
- A compliance schedule, and
- A schedule for submission of certified progress reports no less frequently than every 6 months for sources required to have a schedule of compliance to remedy a violation.

Compliance Status

Drake is currently in compliance with applicable requirements. Any new applicable requirements will be met in accordance with the permit and requirements under 40 CFR Subpart LLL.

Drake is in compliance with all other applicable permit requirements listed in the included Compliance Certification.

Compliance Schedule

The compliance schedule, required as part of the Compliance Plan, must contain the following elements:

- For applicable requirements with which the source is in compliance, a statement that the source will continue to comply with such requirements.
- For applicable requirements that will become effective during the permit term, a statement that the source will meet such requirements on a timely basis.
- A schedule of compliance for sources that are not in compliance with all applicable requirements at the time of permit issuance. Such a schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the source will be in noncompliance at the time of permit issuance.

<u>Statement Regarding Current Applicable Requirements</u>

For Drake proposed emissions sources are in compliance with applicable requirements and will continue to comply with such requirements at the time of permit issuance.

Statement Regarding Future Applicable Requirements

For applicable requirements that will become effective during the permit term, Drake will meet such requirements on a timely basis.

Compliance Schedule

Drake will be in compliance with applicable requirements at the time of permit issuance of this significant permit revision, therefore no compliance schedule is included.

Progress Report Schedule

Drake will operate in compliance with the requirements applicable to the proposed project, no compliance schedule or progress reports are required.

COMPLIANCE CERTIFICATION

The following Compliance Certification is included in this application for a significant permit revision to meet the requirements of Arizona Administrative Code (AAC) R18-2-304 (B), which requires submittal of all information required by "Filing Instructions" as shown in Appendix 1 of AAC Title 18, Chapter 2 (R18-2). Appendix 1 of R18-2 includes a requirement that a Compliance Certification be supplied with the application. The Compliance Certification must include the following:

- Identification of the applicable requirements which are the basis of the certification;
- A statement of methods used for determining compliance, including a description of monitoring, recordkeeping, and reporting requirements and test methods;
- A schedule for submission of compliance certifications during the permit term to be submitted no less frequently than annually, or more frequently if specified by the underlying applicable requirement or by the permitting authority;
- A statement indicating the source's compliance status with any applicable monitoring and compliance certification requirements; and
- A certification of truth, accuracy, and completeness pursuant to R18-2-304(H).

The following paragraphs list the applicable requirements that are the basis for this certification, the methods to be used for determining compliance, and a schedule for submission of compliance certifications.

Identification of Applicable Requirements

Applicable requirements are outlined in the current permit. Drake will continue to comply will all existing applicable requirements and emission limits under the existing permit. Proposed permit changes will include the change in fuels requested as part of this permit revision. No change to existing emission limits is proposed for this project.

Statement of Methods for Determining Compliance

Compliance with the permit conditions above is determined by conducting and documenting the procedures outlined in the approved O&M plan for the facility, conducting performance testing to ensure emission limits are met, and complying with all related existing and future permit conditions in the permit.

Schedule for Submission of Compliance Certifications

Drake currently submits, and will continue to submit, a compliance certification semi-annually during the term of the permit.

Statement of Source's Compliance Status

Drake is in compliance with the applicable requirements as noted in the compliance plan. This application is being submitted to revise the permit for compliance purposes.

Certification of Truth, Accuracy, and Completeness

A signed Certification of Truth, Accuracy, and Completeness is included in this significant permit revision application which applies to elements of the application package, including this Compliance Certification.

APPENDIX 3

Emissions Calculations Tables

Emissions Summary Biomass Project

Emission Point ID	Emission Description	Estimated PM Emissions (tons)	Estimated PM_{10} Emissions (tons)	Estimated $PM_{2.5}$ Emissions (tons) [2]
BIO-UL	Biomass Truck Unloading	0.0120	0.0056	0.0009
BIO-L	Biomass Feed Hopper Loading	0.0120	0.0056	0.0009
BIO-LO	CAT 966 Loader	0.1153	0.1153	0.0283
BIO-TU	Biomass Haul Trucks Unloading to Storage Pile (20-ton per load)	0.0475	0.0475	0.0116
BIO-SP	Biomass Storage Pile	0.77	0.39	0.39
Total		0.96	0.56	0.43

Biomass Loading and Unloading

Emission Point ID	Emission Description	Max Number	Max Production (tpy)	PM Emission Rate (lb/ton) [1]	PM_{10} Emission Rate (lb/ton) [1]	$PM_{2.5}$ Emission Rate (lb/ton) [1]	Control Efficiency (%)	Estimated PM Emissions (tons)	Estimated PM_{10} Emissions (tons)	Estimated $PM_{2.5}$ Emissions (tons)
BIO-UL	Biomass Truck Unloading	1	52,560	0.0005	0.0002	0.00003	0%	0.0120	0.0056	0.0009
BIO-L	Biomass Feed Hopper Loading	1	52,560	0.0005	0.0002	0.00003	0%	0.0120	0.0056	0.0009
Total								0.0239	0.0113	0.0017

NOTES:

[1] Estimated from Batch Drop Equation, AP-42 13.2.4.3 (Eq. 1, 11/06) - See results below.

AP-42 13.2.4-3 (Eq. 1) E=(k(0.0032)(U/5)^1.3)/(m/2)^1.4

WHERE:

E = emission factor (lb/ton)

k = particle size multiplier = 0.74 for PM, 0.35 for PM_{10}, 0.053 for $PM_{2.5}$

U = mean wind speed in miles per hour (mph)

M = material moisture content (%)

Biomass - As received

E ($PM_{2.5}$) = 0.00003 lb/ton

E (PM_{10}) = 0.0002 lb/ton

E (PM) = 0.0005 lb/ton

U for exposed handling areas = 12.26 mph, annual average of highest daily 1-hour averages per day.

M is estimated at 15%, based on representative material specification from lab analysis. M= 15.00

Representative Moisture Data As Received	
Sample ID	% Moisture
Mid Limb	14.51
Red Needle	15.61
Red Limb	15.76

Average	15.29

Maximum Production Rate:	
6	tons per hour
8760	hour per year
52560	tons per year

BIOMASS STORAGE AND TRANSFER

Emissions Unit ID	Filter Cake Receiving and Plant Transport Vehicles	Gross Vehicle Weight	Emission factor (lb/VMT)		Distance Per Round Trip (miles)	Annual VMT (miles/yr)	Max. Uncontrolled Emission Rate (tpy)		Control Measure	Control Efficiency (%)	Estimated Controlled Emissions	
		tons	PM_{10}	$PM_{2.5}$			PM_{10}	$PM_{2.5}$			PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Biomass Loader [1]												
BIO-LO	CAT 966 Loader	25.1	0.463	0.114	0.038	1990.9	0.46	0.11	Water & Sweeping	75.00%	0.1153	0.0283
Paved Roads at Plant [2]												
BIO-TU	Biomass Haul Trucks Unloading to Storage Pile (20-ton per load)	23	0.424	0.104	0.341	895.9	0.19	0.05	Water & Sweeping	75.00%	0.0475	0.0116
Total Material Handling Fugitive Emissions Biomass Storage											0.1627	0.0399

Notes:

Estimated Maximum of 52,560 tons per year Biomass Storage and Transfer Max Rate 6 tons per hour

Wood Chips	Density	15	lbs/cf	405	lbs/cy	0.2025	tons/cy

CAT966 Bucket Capacity - h 5.5 cu yd heaped

CAT966 Bucket Capacity - s 4.8 cu yd struck

Conservatively assume 0.2 tons/cy and 5 cy/bucket or 1 ton per loader trip from stockpile to feed hopper

[1] 5-cy capacity loader used to pick up biomass and load feed hopper

Gross vehicle weight is an average of loaded (25.6 tons) and unloaded (24.6 tons) weights

Maximum loader distance estimated at 200 ft round trip to pick up material and load feed hopper

Miles per trip = 0.038

[2] Haul truck gross vehicle weight is an average of loaded (33 tons) and unloaded (13 tons) weights
Maximum haul distance on paved roads is estimated ~ 1800 ft round trip
Miles per trip = 0.341

For Paved Roads:
AP-42, 13.2.1, Eq 2. $E=(k*sL^{0.91}*W^{1.02})*(1-P/4N)$
WHERE:
E = site specific emission factor (lb/VMT)
k = particle size multiplier from Table 13.2-1.1 (lb/VMT)
sL = surface silt loading (10.1 g/m^2), obtained from average of Concrete Batching and Quarry mean values in Table 13.2.1-3
W = fleet average vehicle weight (tons)
P = 60, ave. days per year with precipitation greater than 0.01 inches, obtained from Figure 13.2.2-1
N = number of days in the averaging period (365 days used for annual emissions)

Constant	PM10	PM2.5
k	0.0022	0.00054

*Ceidars Report

	Gross Vehicle Weight	Emission Factor (lb/VMT)	PM *	PM10	PM2.5
BIO-LO	25.1	E =	1.014	0.463	0.114
BIO-TU	23	E =	0.927	0.424	0.104

*Updated CEIDARS Table with PM2.5 Fractions

	PM2.5 Fraction of Total PM	**PM10 Fraction of Total PM**	**PM2.5 Fraction of PM10**
PAVED ROAD DUST	0.077	0.457	0.169

Biomass Storage Pile

Biomass Storage Pile Emissions										
Fugitive Emission Source ID	**Description**	**Maximum Storage Area**	**Units**	**PM Emission Rate (lb/hr-acre)**	**PM Emission Rate (lb/hr) [1]**	**PM_{10} Emission Rate (lb/hr) [1]**	**$PM_{2.5}$ Emission Rate (lb/hr) [1]**	**PM Emissions (tons)**	**PM_{10} Emissions (tons)**	**$PM_{2.5}$ Emissions (tons)**
BIO-SP	Biomass Storage Pile	0.5	acres	0.3530	0.1765	0.0883	0.0883	0.77	0.39	0.39

1 - Storage Pile Emissions

A total suspended particulate (TSP) emission factor for wind erosion of active storage piles was included in a USEPA report published in 1989. This emission factor is not included in AP-42. Annual TSP emissions for wind blown dust from active storage piles were estimated from the following equation:

USEPA, January 1989. Air/Superfund National Technical Guidance Study Series; Volume III – Estimation of Air Emissions from Cleanup Activities at Superfund Sites, Interim final report EPA-450/1-89-003.

TSP (lb/year/acre of surface) = 1.7 (s/1.5) (365 [365-p]/235) (f/15)

where:

s = silt content of material (weight %)

p = number of days per year with at least 0.01 inch of precipitation

f = percentage of time unobstructed wind speed is greater than 12 mph at mean pile height

s	Silt test 5-gal sample of biomass sawdust - Appendix C.2 Procedures for Laboratory Analysis of Surface/Bulk Dust Loading Samples	4.32	Product sample % by weight passing 200 mesh
p	No. of days with 0.01 inch of precipitation per year	60	AP-42 Figure 13.2.2-1
f	% of time unobstructed wind speed exceeds 5.4 m/sec (12 mph)	20	Estimated Chino Valley Average Wind Speed

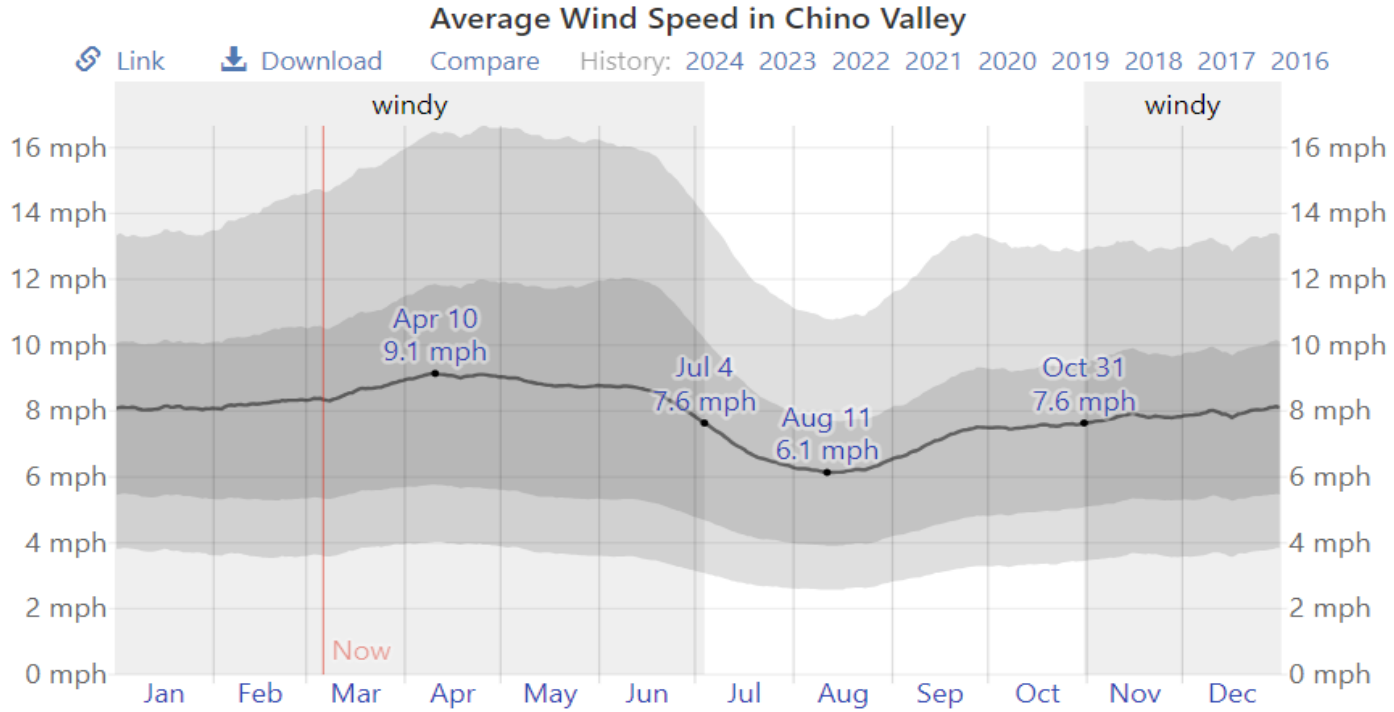
	PM		PM_{10} (50% of PM)	$PM_{2.5}$ (Same as PM_{10})
Storage piles (Acres)	PM Emissions Lb/hr-acre	PM Emissions lb/hr	PM_{10} Emissions lb/hr	$PM_{2.5}$ Emissions lb/hr
1	0.3530	0.3530	0.1765	0.1765

Note: Estimated maximum of 337 cubic yards or 68 tons covering approximately 0.05 acres

Emissions conservatively estimated at 0.5 Acre Storage Pile Area

PM 1.7*(s/1.5)[(365-p)/235)]*(f/15) Air Pollution control manual (1992), Chapter 4

		lb/day-acre		
PM emission factor =	8.4725		0.3530	lb/hr-acre



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (mph)	8.1	8.2	8.6	9.1	8.8	8.5	6.9	6.2	7.1	7.5	7.8	8.0

Wind Speed > 12mph = 18.8% of time - Conservatively estimate 20% for emissions calculations.
https://weatherspark.com/y/2470/Average-Weather-in-Chino-Valley-Arizona-United-States-Year-Round

Table 13.2.4-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. Of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. Of Samples	Range	Mean	No. Of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	—	7
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	—	15	1	—	6.6
		Sinter	1	—	0.7	0	—	—
		Limestone	3	0.4 - 2.3	1.0	2	ND	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	ND	11	1	—	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	—	—
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	—	2.6	1	—	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	—	9.2	1	—	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	—	12	1	—	11

[a] References 1-10. ND = no data.

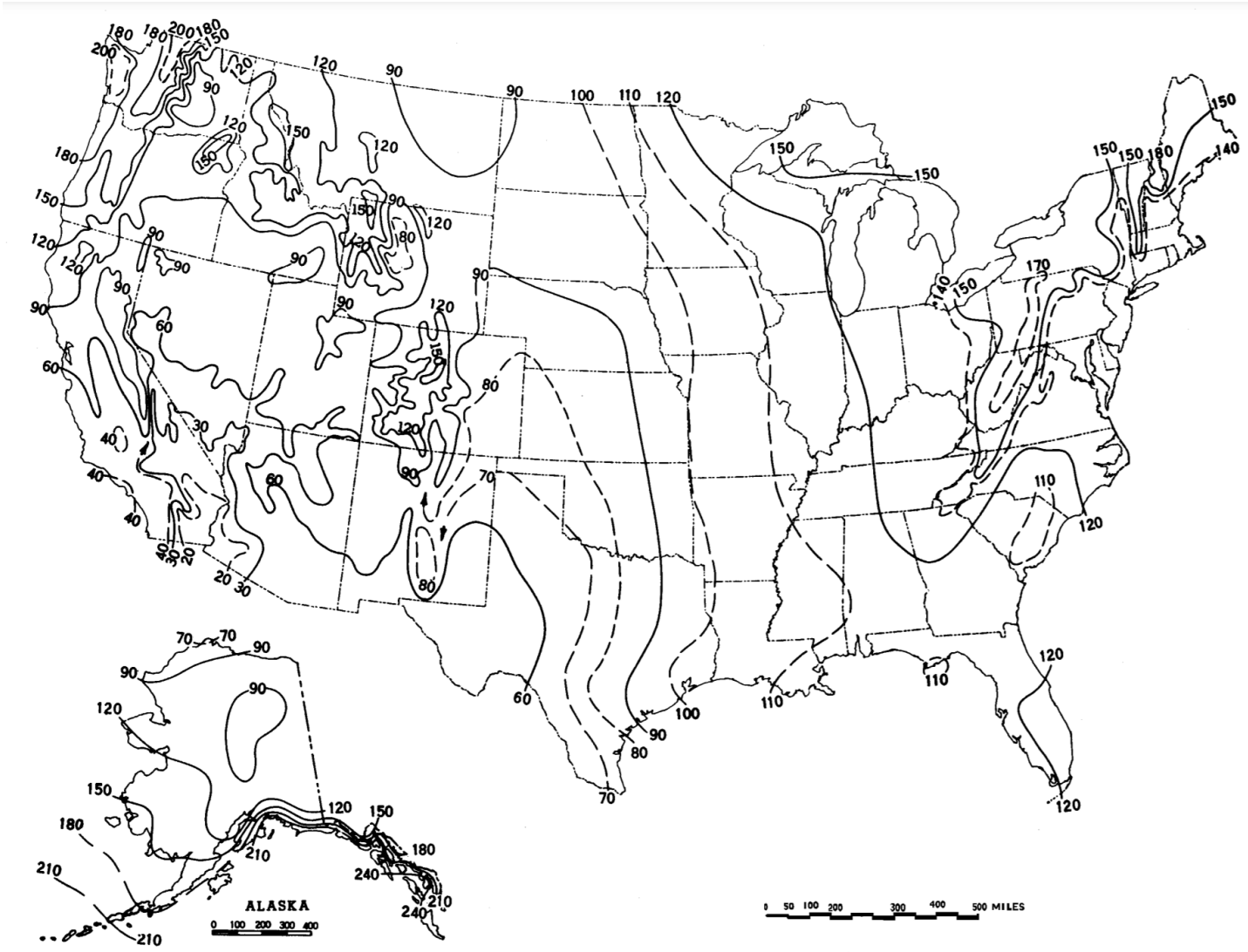
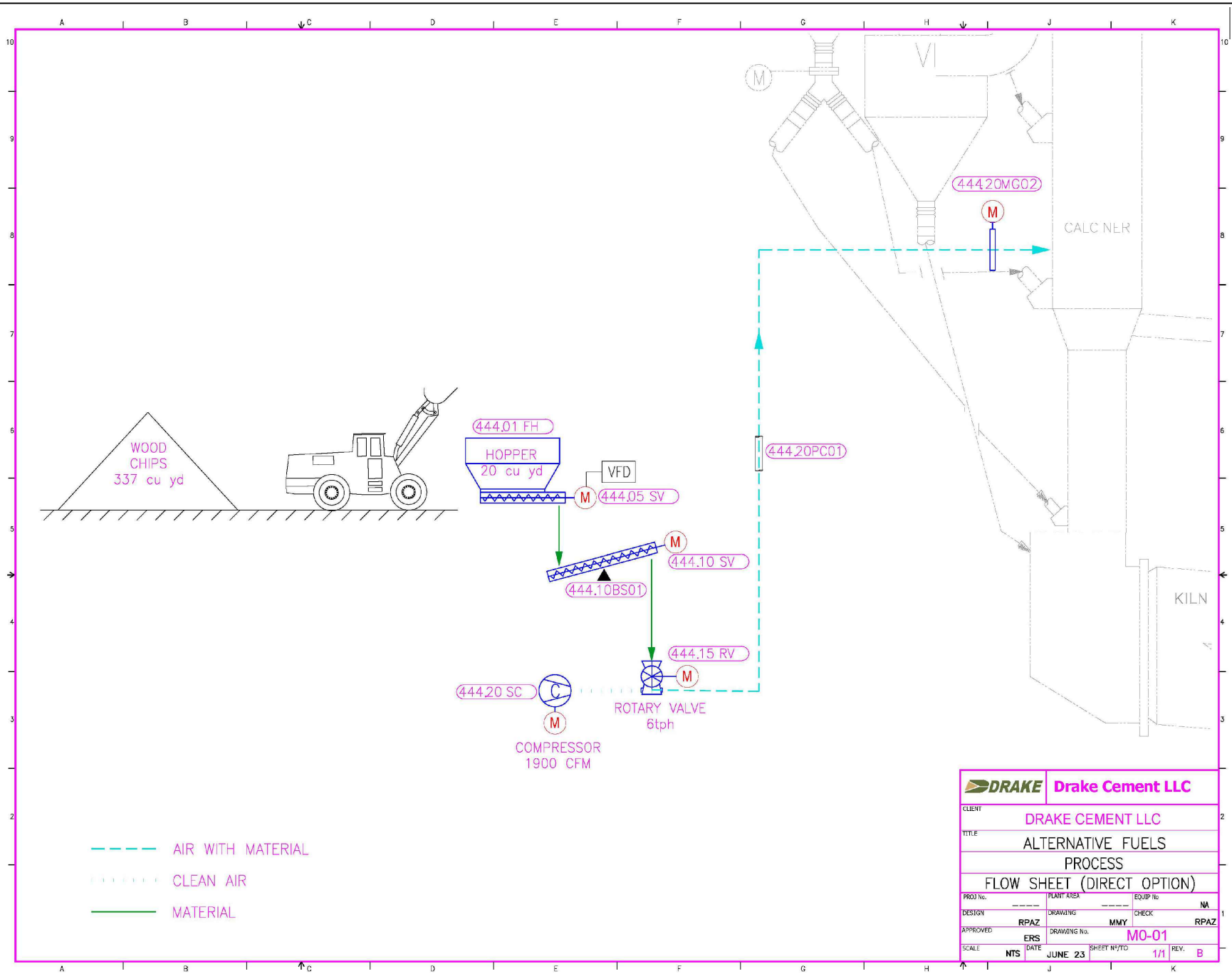


Figure 13.2.2-1. Mean number of days with 0.01 inch or more of precipitation in United States.

APPENDIX 4

Revised Proposed Process Flow Drawings



Prepared For:

Prepared By:

Map Reference: Alternative Fuels Process DWG. M0-01 Rev. B

DRAKE CEMENT

Drake Cement Biomass Project

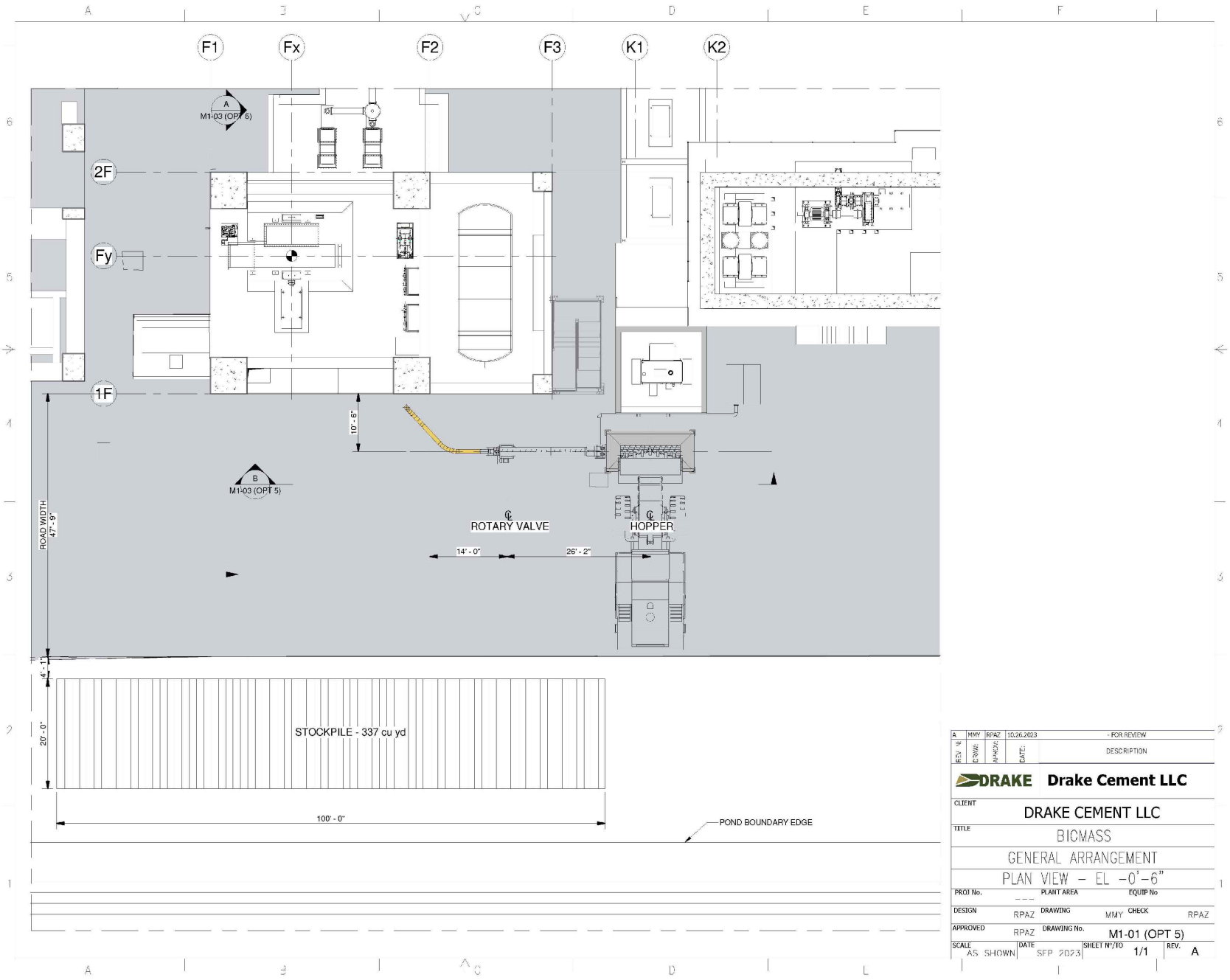
Significant Permit Revision to Air Permit No. 93430

ORIZON INDUSTRY•PEOPLE•ENVIRONMENT

Flow Diagram

Date: 03/06/24

Figure: 1



Prepared For: DRAKE CEMENT

Prepared By: ORIZON INDUSTRY • PEOPLE • ENVIRONMENT

Map Reference: Biomass General Arrangement DWG. M1-01 Rev. A

Drake Cement Biomass Project

Significant Permit Revision to Air Permit No. 93430

Site Map Plant View

Date: 03/06/24

Figure: 2

APPENDIX 5

Supporting Documents

TECHNICAL SPECIFICATION FOR

BIOMASS PROJECT

DRAKE CEMENT

JANUARY 2024

A	MCH	RPAZ	RPAZ	Release to revision	01.19.24
Rev.	**Elaborated**	**Revised**	**Approved**	**Description**	**Date**

Rev	Revision History
A	Issued by Permitting purpose

VOLUME I

INDEX

1. INTRODUCTION **3**
2. PROJECT DESCRIPTION AND PHILOSOPHY **3**
3. DETAILED SPECIFICATION OF CONSTRUCTION DELIVERABLES **6**
4. SITE SPECIFICATIONS AND STANDARDS **8**
4.1 DESIGN SPECIFICATIONS: 8
4.1.1 Design Site Parameters: 8
4.1.2 Design Criteria 8
5. ATTACHMENTS **10**
Table 1: Materials raw properties 10

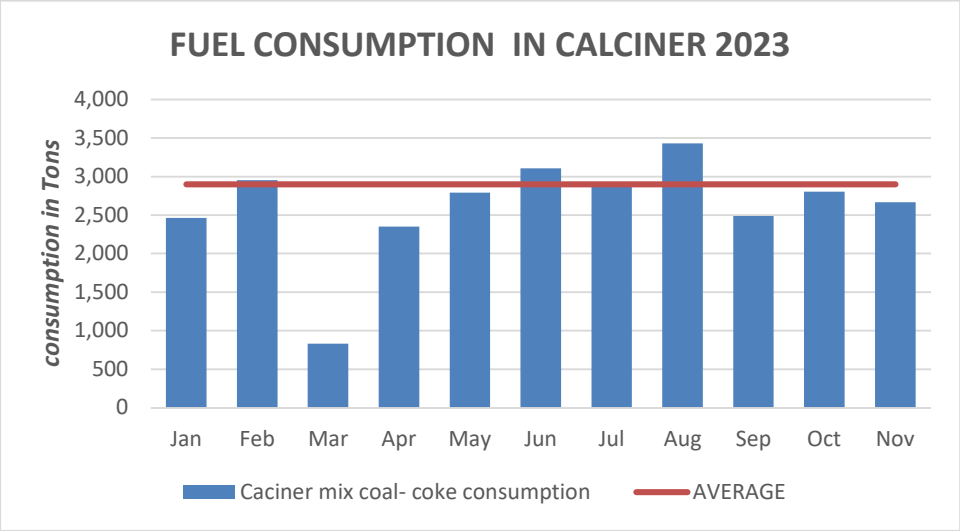
1. INTRODUCTION

DRAKE CEMENT LLC as a part of the sustainability commitment looking the carbon emission reduction has decided to install an alternative fuel system.
As a first stage of this commitment, Drake will be fed into the calciner the alternative fuel looking to replace the current fuel used which is a mix between coal and pet coke, whose consumption values on average lately were about 32,000 tons of mixed coal-coke approximate equivalent to 130 MMCO2 per year.

This new alternative fuel system will have 2 stages: the first stage called the **Biomass system** consists of the installation of a pneumatic system to directly feed the calciner with wood chips. The second stage system involves a storage center to feed the calciner with different alternative fuels such as wheels, plastic, organic fuels, and wood. The technical specs hereby focus only on the first stage, feeding the calciner with wood chips.

2. PROJECT DESCRIPTION AND PHILOSOPHY

The project is designed to provide a total replacement of the traditional fuel used in the calciner (mix coal - coke) with wood chips in a progressive way.
The forecasted fuel replacement will be performed progressively, starting with replacing 10- 20% of mixed coal-coke and increasing until 50% replacement initially, later up to reach out 100% of the mixed coal-coke, our design values of the Biomass system were obtained by taking the 2023 fuel consumption data, taking out the not representative months due to kiln down events, in summary: the fuel consumption of mix coal-coke in the calciner was on average 2,950 tons per month converting this value to heat consumption (11,810 BTU/lb per mix coal-coke) it is equivalent to 69,679 MMBTU per month, therefore the biomass project must feed at calciner the same heat value using wood chips.



*Note: January, March, April, and September have been taken out \of the average calculation

According to the characteristics of the wood chip detailed in Table 1, Section 5, the biomass material has a heat value of 8200 BTU/lb. and a density 15 pcf, therefore for 100% replacement of mix coal-coke in the calciner, we need to feed a 4,248 tons per month of wood chips which is equivalent to 5.9 tons/hr.

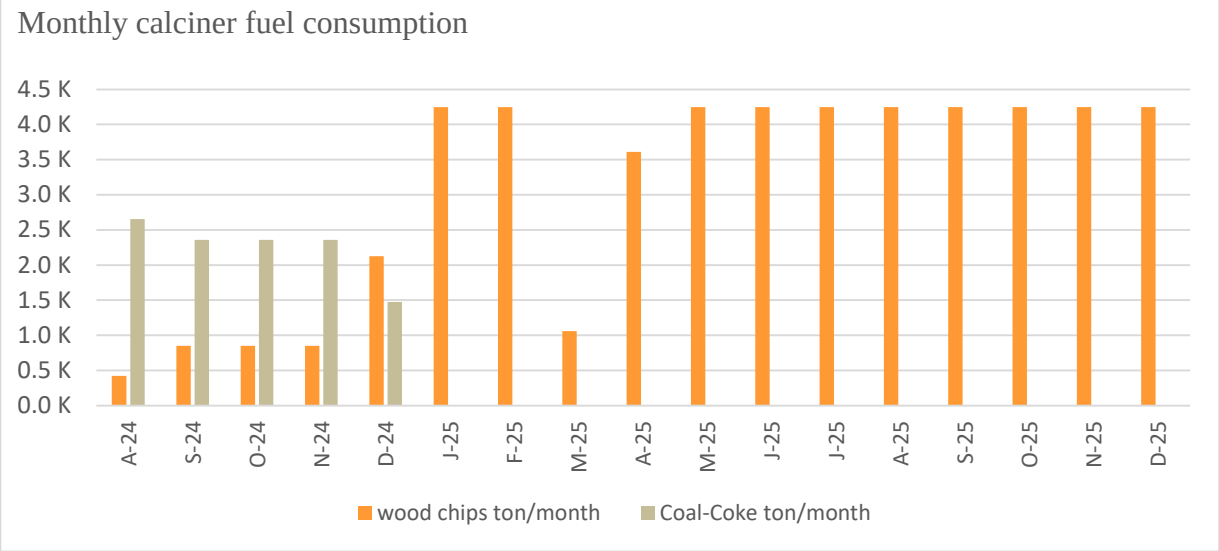
Replacement percentage	Fuel consumption	Heat value wood	Wood feed rate to Calciner
%	BTU/hr	BTU/lb	Stph
10%	9,674,721	8200	0.6
20%	19,349,443	8200	1.2
50%	48,373,607	8200	2.9
100%	96,747,214	8200	5.9

REMARK: *the max design capacity is 5.9 tons/hr. <> 142 tons/day considers the case of 100% replacement of the mix coal-coke in the calciner, therefore all the equipment selected could reach this work capacity.*

On the basis of the wood chips feeding increasing, the mix of coal-coke feeding will be reduced, fuel feeding according to the planning table below:

		2024						2025
		Jul	Aug	Sep	Oct	Nov	Dec	Month
Material	%replacement	0%	10%	20%	20%	20%	50%	100%
Woodchips	stph	-	0.59	1.18	1.18	1.18	2.95	5.90
Coal-Coke	stph	4.10	3.69	3.28	3.28	3.28	2.05	-

Monthly woodchip vs Coal-coke forecasting consumption:



The biomass system has the following areas and equipment:

a) Storage Pile:
The storage will have a capacity of 9,100 ft3 <> 68 tons, dimensions 100' x 20' plant view at 45 degrees angle to repose, to this volume the system can work approx. 12 hr. continuously in the scenario that Drake replaces 100% of existing fuel in the calciner.

b) Feeding Hopper:
It will be fed with a wheel loader such as CAT 966 or bigger. The hopper will have a capacity of 20 cuyd or 540 cuft, with this capacity the system can operate for 40 minutes, before being fed again.

c) Twin Screw Feeder:
The hopper includes a dosing twin-screw feeder installed at the bottom, and the screw feeders have VFD allowing control of the flow of wood chip feeding at the calciner.

d) Screw conveyor – collector:
The screw conveyor will be loaded from the twin screw feeder and unloaded to a rotary valve, this screw conveyor will has a scale control system to weigh and control the material dosing on the twin screw feeders through the VFD and integrate the control system.

e) Rotary valve:
The rotary valve will feed the pneumatic pipe, it must be special for feeding wood chips in addition, must have a good seal to connect with the pneumatic pipe.

f) Blower:
Blower AERZEN GM80L was selected for conveying 5.9 tons/hr. equivalent to replacing up to 100% of mixed coal - coke fuel.

g) Pipeline
It will use the existing pneumatic pipe installed on-site whose diameter is 8 inches.

h) Control and automation.
To be supplied by competent suppliers such as Siemens, ABB, Rockwell or equivalent.

3. DETAILED SPECIFICATION OF CONSTRUCTION DELIVERABLES

ELECTROMECHANICAL

SUBAREA 444 FUEL FEED

Equipment Description		***Feeding Hopper***
WBS Tag	:	**444.01.FH**
Supplier	:	TBD
Type	:	Rectangular w/cone steel
Stored material	:	Wood chips
		Table 1, See Section 5 for materials properties
Silo Volume	:	540 cu ft <> 20 cuyd
Rectangular size	:	180 in x 76 in
Rectangular height	:	43 in
Cone height	:	47 ½ in
Hopper angle	:	60°

Equipment Description		***Twin Screw feeder - bottom the hooper***
WBS Tag	:	**444.05SV**
Supplier	:	Conveyor
Material	:	Wood chips
		Table 1 See Section 5 for materials properties
Maximum material temperature	:	Ambient
Material Bulk Density	:	15 pcf
Capacity	:	Range 0.6 - 6 stph (@10% to @ 100%)
Diameter	:	Ø (TBD)
Inclination	:	0°
Length	:	164 in
Filling	:	100%
Reversible	:	No
RPM	:	Variable (VFD)

Equipment Description		***Screw conveyor collector***
WBS Tag	:	**444.10SV**
Supplier	:	Conveyor
Material	:	Wood chips
		Table 1 See Section 5 for materials properties
Maximum material temperature	:	Ambient
Material Bulk Density	:	15 pcf
Capacity	:	6 stph (@100%)
Diameter	:	(TBD)
Inclination	:	15°
Length	:	270 in

Filling	:	30%
Reversible	:	No
RPM		TBD by supplier
Equipment Description	:	***Single idler screw scale for screw conveyor collector***
WBS Tag	**:**	**444.10BS01**
Supplier	**:**	TBD
Capacity	**:**	0.6 to 6 stph
Equipment Description		***Rotary Valve (existing)***
WBS Tag	:	**444.15 RV**
Supplier	:	Rotolock
Material	:	Wood chips
		Table 1 See Section 5 for materials properties
Maximum material temperature	:	Ambient
Material Bulk Density	:	15 pcf
Capacity	:	5.8 ft3/rev
RPM	:	15 RPM
Equipment Description	:	***Air compressor***
WBS Tag	:	**444.20SC**
plier	:	AERZEN
Type	:	Screw compressor
Flow Rate	:	1,900 scfm
Inlet pressure	:	12.5 psi
Outlet pressure	:	19 psi
Inlet Air Temperature	:	90 °F (32°C)
Oulet Air Temperature	:	185 °F (85°C)
Equipment Description		***Pneumatic conveying pipe to calciner.***
WBS Tag	:	**444.20 PC01**
Type	:	Steel Pipe
Pipe Diameter	:	8 in
Pipe horizontal length	:	48 ft - 3 in (existing pipe 474 & new pipe 105in)
Pipe vertical length.	:	68 ft - 3 in (existing)
Bend 90°	:	4 (existing)
Bend 135°	:	1 (new)
Equipment Description		***Motorized Slide gate***
WBS Tag	:	**444.20 MG02**
Type	:	knife gate, xx"; Motorized
Stored material	:	Wood chips
		Table 1 See Section 5 for materials properties

4. SITE SPECIFICATIONS AND STANDARDS

4.1 DESIGN SPECIFICATIONS:

4.1.1 Design Site Parameters:

Country	:	USA
Plant Site	:	Drake, Arizona
Altitude	:	4 652 feet (1 418 m) over sea level
Climatic Conditions:		
Temperature ambient	:	min. 14 °F (-10°C) - max. 110°F (44°C)
Humidity ambient	:	min. 20% - max. 95%
Electrical parameters:		
Medium Tension Eq.	:	4.16 kV, 60 Hz, 3 phase
Low Tension Equip.	:	460 V, 60 Hz, 3 phase
Control equipment	:	115 V, 60 Hz, 1 phase
Motors:		
Insulation Class	:	B or F
Protection	:	IP55
Wind Conditions	:	Max. design wind is 10 miles/hr
Seismic Conditions	:	The Drake area is a high seismic region. Therefore, the more rigorous design conditions should be applied.

4.1.2 Design Criteria

4.1.2.1 System of Measurement

All plant general arrangement, process flow diagrams, equipment arrangement and vendor supplied arrangements shall be dimensioned in English and metric units.

All additional drawings including proprietary, manufacturing and detail shall be per their standard issue of supply

4.1.2.2 Mechanical design

Codes Specification Standards:

1.0	AFBMA	Anti-Friction Bearing Manufactures Association
2.0	AGMA	American Gear Manufacturer's Association
3.0	AMCA	Air Moving & Conditioning Association
4.0	ANSI	American National Standard Institute
5.0	API	American Petroleum Institute
6.0	ASCMA	American Sprocket Chain Manufacturing Association
7.0	ASME	American Society of Mechanical Engineers
8.0	ASTM	American Society for Testing $ Materials

9.0	AWWA	American Waterworks Associations
10.0	CEMA	Conveyor Equipment Manufacturer's Association
11.0	AJMA	Expansion Joint Manufacturers Association
12.0	EOCI	Electrical Overhead Crane Institute
13.0	EPA	Environmental Protection Agency
14.0	FM	Factory Mutual System
15.0	HI	Hydraulic Institute
16.0	ISA	Instrument Society of American
17.0	IEEE	Institute of Electrical & Electronics Engineers, Inc.
18.0	IPCEA	Insulated Power Cable Engineers Association
19.0	MESA	Mining Enforcement & Safety Administration
20.0	MSHA	Mining Safety and Health Administration
21.00	MPTA	Mechanical Power Transmission Administration
22.0	NBFU	National Board Fire Under writers
23.0	NEC	National Electric Code
24.0	NEMA	National Electric Manufacturers Association
25.0	NFPA	National Fire Protection Association
26.0	OSHA	Occupational Safety and Health Association
27.0	PCA	Portland Cement Association
28.0	RMA	Rubber Manufacturers Association
29.0	SSPC	Steel Structures Painting Council
30.0	UL	Underwriters Laboratories

4.1.2.3 Structural design

Codes, Specification Standards (latest edition)

1.0	American Concert Institute Building (ACI 318-)
2.0	Manual of Standard Practice for detailing Reinforced Concrete Structures (ACI 315-)
3.0	American Concrete Institutes Recommended Practice for design and construction of concrete Bins, Silos and Bunkers for Storing Granular materials (ACI 313-) and Commentary
4.0	Specification for design, fabrication and erection of structural steel for building AISC Latest Edition
5.0	Uniform Building Code – Latest edition used by governing agency
6.0	Occupational Safety And Health Administration Standards (OSHA)
7.0	Mining Safety and Health Administration (MSHA)
8.0	Structural and Architectural Standard details at end of this section
9.0	Special design consideration shall by given to unsure that damaging harmonic conditions do not exist in elevated structures supporting vibration or rotating equipment under any levels of machine unbalance.

4.1.2.4 Electrical design

Codes, Specification Standards (latest edition)
The electrical design and construction shell be governed by the latest revision of the following codes and standard:

1.0	American National Standard Institute (ANSI)
2.0	Institute of Electrical & Electronics Engineers, Inc (IEEE)
3.0	Instrument Society of America (ISA)
4.0	Insulated Power Cable Engineering Association (IPCEA)
5.0	National Electric Manufacturers Association (NEMA)
6.0	National Electric Code (NEC)
7.0	Joint Industrial Council (JIC)
8.0	Mining Safety and Health Administration (MSHA)
9.0	Occupational Safety and Health Association (OSHA)
10.0	Underwriters Laboratories (UL)
11.0	National Fire Protection Association (NFPA)
12.0	Uniform Building Code International (UBC)
13.0	Illuminating Engineering Society (IES)
14.0	Conference of building Officials
15.0	California Safety Orders

5. ATTACHMENTS

Table 1: Materials properties

Material	*Moisture (%)*	*Temperature (Deg F)*	*Lump Size (in)*			*Density (lb/cu.ft)*	*Heating value (BTU/lb)*	
	Avg	*Avg*	*L*	*W*	*T*	*Avg*	*Min*	*Max*
Wood chips	15	(*)	1.5	0.75	0.25	15	8200	9200

(*) to consider ambient temperature, see 5.1.1 Design Site Parameters

OEMs Existing equipment

Drawings

May 22, 2023 Service Request No:T2300830

Matt Monahan
Reliance Brush Management Inc
4360 Friendly Meadow Rd.
Prescott, AZ 86305

Laboratory Results for:

Dear Matt,

Enclosed are the results of the sample(s) submitted to our laboratory May 10, 2023
For your reference, these analyses have been assigned our service request number **T2300830.**

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the complete report. Results
apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Wendy Hyatt
Laboratory Director

ADDRESS 4208 S Santa Rita Avenue, Tucson, AZ 85714
PHONE +1 520 573 1061 | FAX +1 520 623 9218
ALS Group USA, Corp.
dba ALS Environmental

Chain of Custody

T2300830 **5**

Reliance Brush Management Inc

ALS Environmental - Tucson
ADDRESS 4208 S Santa Rita Ave, Tucson, AZ 85714
PHONE +1 520 573 1061
ALS Group USA, Corp.

*Credit Card payments are charged an extra 3%

REPORTING				INVOICING			
Company Name:	Reliance Brush Management Inc			Company Name:	Same as Reporting		
Contact Name:	Matt Monahan			AP Contact:			
Address:	4360 W Friendly Meadow Rd			Address:			
City, State ZIP:	Prescott, AZ 86305			Email:		Phone:	
Email:	Matt@reliancebrush.com	Phone:	928 386 0369	PO Number:			
CC Report To:				CC Invoice To:			

RELINQUISHED BY			RECEIVED BY		
Print Name	Signature	Date/Time	Print Name	Signature	Date/Time
			Diego Mendez		5/9/23 1140

PROJECT INFORMATION

Quote No:
Project Name:
Project Number:
Sampler's Name:

REQUESTED ANALYSIS

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	Composite - YES or NO	Prep grind <1 mm D346/E829	Ash D3174/D1102/D482	Prox (Moist, Ash, VM,FC D7582	Ultimate (CHNOS ash) D3176	Carbon, Total D6316/D5373/E1915	CHN D5373/D5291	Halogens (Br, Cl, F) E859/9056	BTU	TAT (circle) *Same *Next BD *2BD *3BD *5BD Routine-10BD *RUSH SERVICE - Please check for availability	Comments
Wood Sample 1 Green Needle	Solid	05/08/23		001			x	x	x	x	x	x	x	x		
Wood Sample 2 Green Limb	Solid	05/08/23		002			x	x	x	x	x	x	x	x		
Wood Sample 3 Mid Needle	Solid	05/08/23		003			x	x	x	x	x	x	x	x		
Wood Sample 4 Mid Limb	Solid	05/08/23		004			x	x	x	x	x	x	x	x		
Wood Sample 5 Red Needle	Solid	05/08/23		005			x	x	x	x	x	x	x	x		
Wood Sample 6 Red Limb	Solid	05/08/23		006			x	x	x	x	x	x	x	x		

4208 S.Santa Rita Ave.
Tucson, AZ 85714
T: +1 520 573 1061
www.alsglobal.com

Sample Receipt Form

T2300830 5
Reliance Brush Management

Client/Project: Reliance Brush Manageme

Work Order Number:

Received by: Diego Mendez Date & Time: 5/9/2023 1140 Matrix: Solid

Samples were received via?: UPS Samples were received in: Box

Were custody seals on containers? ○ Yes ◉ No ○ NA If yes, how many and where?

If present were custody seals intact? ◉ Yes ◉ No If present, were they signed and dated? ○ Yes ◉ No

Arrival Temp C	Temp Blank C	Tracking Number
ambient	n/a	1Z3253480320004813

Packing material used? Paper

Did all the bottles arrive in good condition (unbroken)? ◉ Yes ○ No ○ NA If No, record comments below

Did all sample labels and tags agree with COC? ◉ Yes ○ No ○ NA If No, record discrepancies below

Were all the appropriate containers and volumes received for the tests indicated? ◉ Yes ○ No ○ NA

Are samples received deemed acceptable? ◉ Yes ○ No MSDS included with paperwork? No

Comments:
6 qrt size sandwich bags of samples

As a part of ISO 17025 protocols, ALS must notify clients that the quoted analytical methods performed by ALS may have minor modifications from the methods as published. These modifications are written into our Standard Operating Procedures and do not impact the quality of the data. Receipt of this document will be considered an acceptance of the procedures used by the laboratory for analysis unless notified by the client.
Modifications may include, but are not limited to:

- The analysis of a sample matrix that differs from that stated in the published method (example - ASTM D5865 Standard Test Method for Gross Calorific Value of Coal and Coke is used for other matrices such as biomass, Tire Derived Fuel, etc.).
- Analyzing a sample mass that differs from those in the published method (example - to accommodate samples with high concentrations of analyte, samples of limited volume, or to comply with the instrument manufacturer's operating guidelines).
- Instruments used for the analysis may differ from those listed in the published method (example - using ICP- OES when the method references items Atomic Absorption Spectroscopy)

Client: Reliance Brush Management Inc
4360 Friendly Meadow Rd.
Prescott, AZ 86305
Attn: Matt Monahan

Project: T2300830 **Date Received:** May 10, 2023

Certificate of Analysis

Sample ID:	Sample Date and Time		Lab #:	Moisture, Total	Volatile Matter		Fixed Carbon		Ash	
				D7582 Proximate by Automated TGA System						
				wt%	As Received wt%	Moist. Free wt%	As Received wt%	Moist. Free wt%	As Received wt%	Moist. Free wt%
~~Wood Sample 1 Green Needle~~	~~5/8/23~~	~~n/a~~	~~T2300830-001~~	~~SAMPLE NO REPRESENTATIVE~~ 46.74	42.37	79.55	8.30	15.59	2.59	4.86
~~Wood Sample 2 Green Limb~~	~~5/8/23~~	~~n/a~~	~~T2300830-002~~	~~SAMPLE NO REPRESENTATIVE~~ 42.70	45.47	79.38	10.35	18.08	1.45	2.54
~~Wood Sample 3 Mid Needle~~	~~5/8/23~~	~~n/a~~	~~T2300830-003~~	~~SAMPLE NO REPRESENTATIVE~~ 7.97	73.18	79.51	15.39	16.73	3.46	3.76
Wood Sample 4 Mid Limb	5/8/23	n/a	T2300830-004	16.11	68.37	81.50	14.51	17.30	1.01	1.21
Wood Sample 5 Red Needle	5/8/23	n/a	T2300830-005	8.15	72.92	79.39	15.61	17.00	3.32	3.61
Wood Sample 6 Red Limb	5/8/23	n/a	T2300830-006	10.59	72.07	80.60	15.76	17.62	1.59	1.78

Client: Reliance Brush Management Inc
4360 Friendly Meadow Rd.
Prescott, AZ 86305
Attn: Matt Monahan

Project: T2300830 **Date Received:** May 10, 2023

Certificate of Analysis

Sample ID:	Sample Date and Time		Lab #:	Carbon, Total D5373 Moist. Free wt%	Hydrogen, Total D5373 Moist. Free wt%	Nitrogen, Total Moist. Free wt%	Oxygen Calculated Moist. Free wt%	Sulfur, Total D4239 Moist. Free wt%		Chloride, Total 9056 Moist. Free ppm
~~Wood Sample 1 Green Needle~~	~~5/8/23~~	~~n/a~~	~~T2300830-001~~	~~51.24~~ SAMPLE NO REPRESENTATIVE	~~7.65~~ SAMPLE NO REPRESENTATIVE	1.01	35.11	0.13		155
~~Wood Sample 2 Green Limb~~	~~5/8/23~~	~~n/a~~	~~T2300830-002~~	~~50.62~~ SAMPLE NO REPRESENTATIVE	~~6.85~~ SAMPLE NO REPRESENTATIVE	0.23	39.76	<0.04		43
~~Wood Sample 3 Mid Needle~~	~~5/8/23~~	~~n/a~~	~~T2300830-003~~	~~51.10~~ SAMPLE NO REPRESENTATIVE	~~7.38~~ SAMPLE NO REPRESENTATIVE	0.94	36.23	0.10		297
Wood Sample 4 Mid Limb	5/8/23	n/a	T2300830-004	49.58	7.08	0.28	41.82	0.03		90
Wood Sample 5 Red Needle	5/8/23	n/a	T2300830-005	52.84	7.94	0.92	34.59	0.10		200
Wood Sample 6 Red Limb	5/8/23	n/a	T2300830-006	49.56	6.75	0.27	41.62	0.03		84

Client: **Reliance Brush Management Inc**
4360 Friendly Meadow Rd.
Prescott, AZ 86305
Attn: **Matt Monahan**

Project: **T2300830**

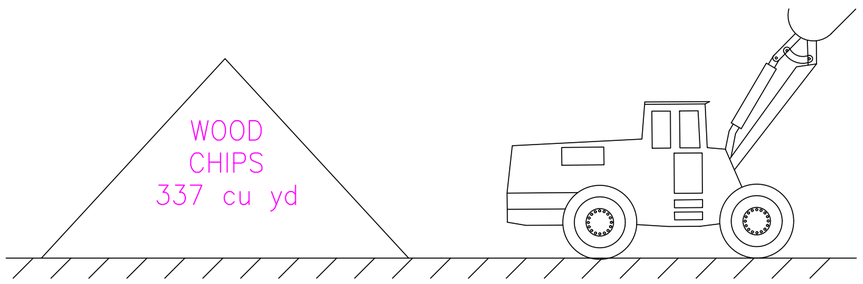
Date Received: **May 10, 2023**

Certificate of Analysis

Sample ID:	Sample Date and Time		Lab #:		Heating Value (Gross) D5865 As Received BTU/lb	Heating Value (Gross) D5865 Moist. Free BTU/lb				
Wood Sample 1 Green Needle	~~5/8/23~~	~~n/a~~	~~T2300830-001~~		~~5,169~~	~~9,706~~	SAMPLE NO REPRESENTATIVE			
Wood Sample 2 Green Limb	~~5/8/23~~	~~n/a~~	~~T2300830-002~~		~~5,357~~	~~9,354~~	SAMPLE NO REPRESENTATIVE			
Wood Sample 3 Mid Needle	~~5/8/23~~	~~n/a~~	~~T2300830-003~~		~~8,938~~	~~9,713~~	SAMPLE NO REPRESENTATIVE			
Wood Sample 4 Mid Limb	5/8/23	n/a	T2300830-004		7,731	9,215				
Wood Sample 5 Red Needle	5/8/23	n/a	T2300830-005		9,286	10,110				
Wood Sample 6 Red Limb	5/8/23	n/a	T2300830-006		8,244	9,221				

DRAKE CEMENT

DRAWINGS AND DIAGRAMS



444.01 FH

HOPPER
20 cu yd

VFD

M 444.05 SV

M 444.10 SV

444.10BS01

444.15 RV

M

444.20 SC

C

M

ROTARY VALVE
6tph

COMPRESSOR
1900 CFM

M

VI

444.20MG02

M

CALCINER

444.20PC01

KILN

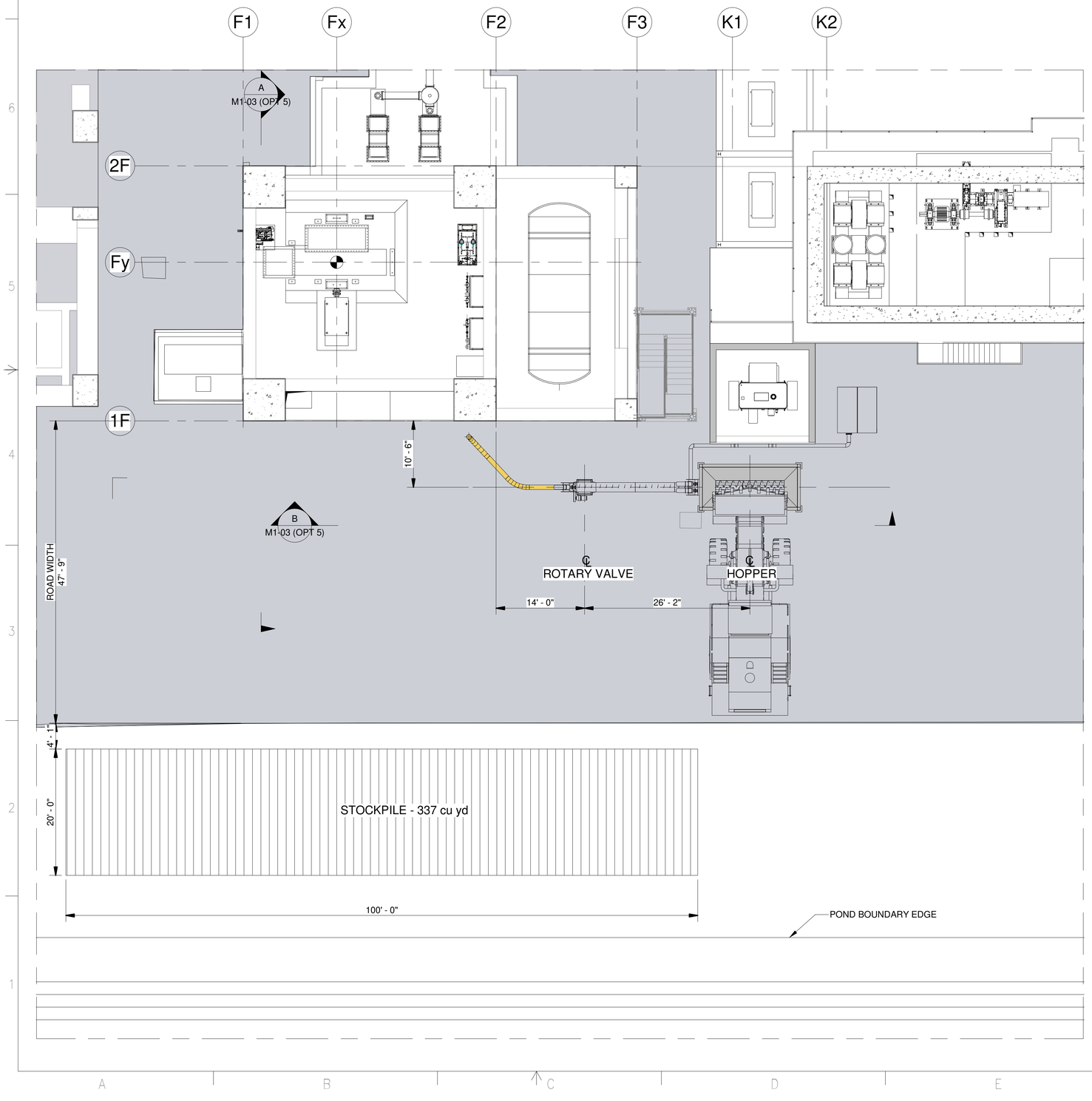
AIR WITH MATERIAL

CLEAN AIR

MATERIAL

DRAKE	Drake Cement LLC
CLIENT	DRAKE CEMENT LLC
TITLE	ALTERNATIVE FUELS PROCESS FLOW SHEET (DIRECT OPTION)

PROJ No. ----	PLANT AREA ----	EQUIP No NA	
DESIGN RPAZ	DRAWING MMY	CHECK RPAZ	
APPROVED ERS	DRAWING No. M0-01		
SCALE NTS	DATE JUNE 23	SHEET N°/TO 1/1	REV. B



REV N:	DRAW:	APROV:	DATE:	DESCRIPTION
A	MMY	RPAZ	10.26.2023	- FOR REVIEW

DRAKE **Drake Cement LLC**

CLIENT: DRAKE CEMENT LLC

TITLE: BIOMASS

GENERAL ARRANGEMENT

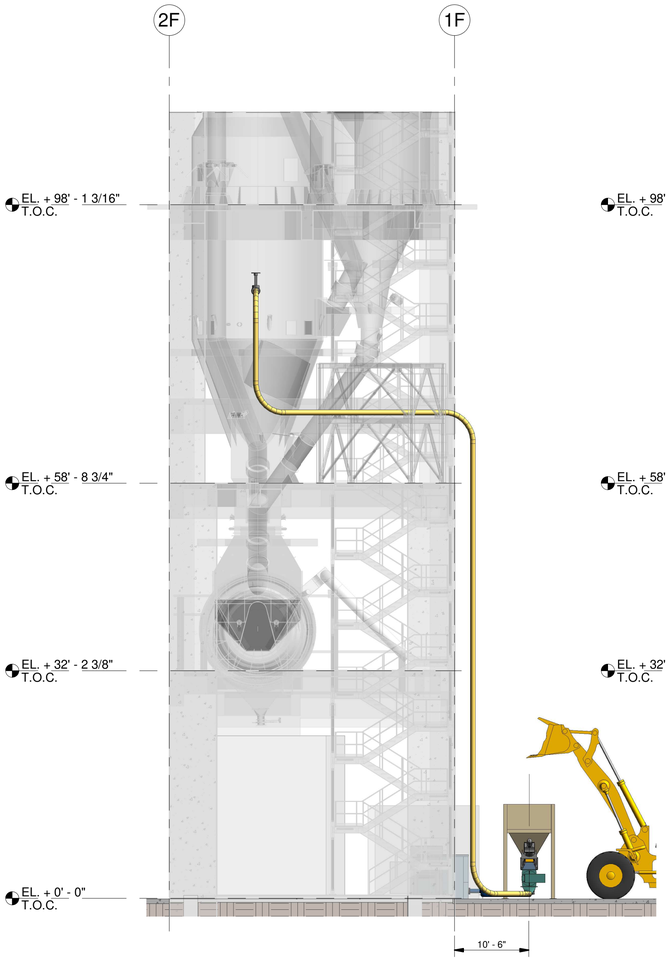
PLAN VIEW – EL +0'-6"

PROJ No.	PLANT AREA	EQUIP No

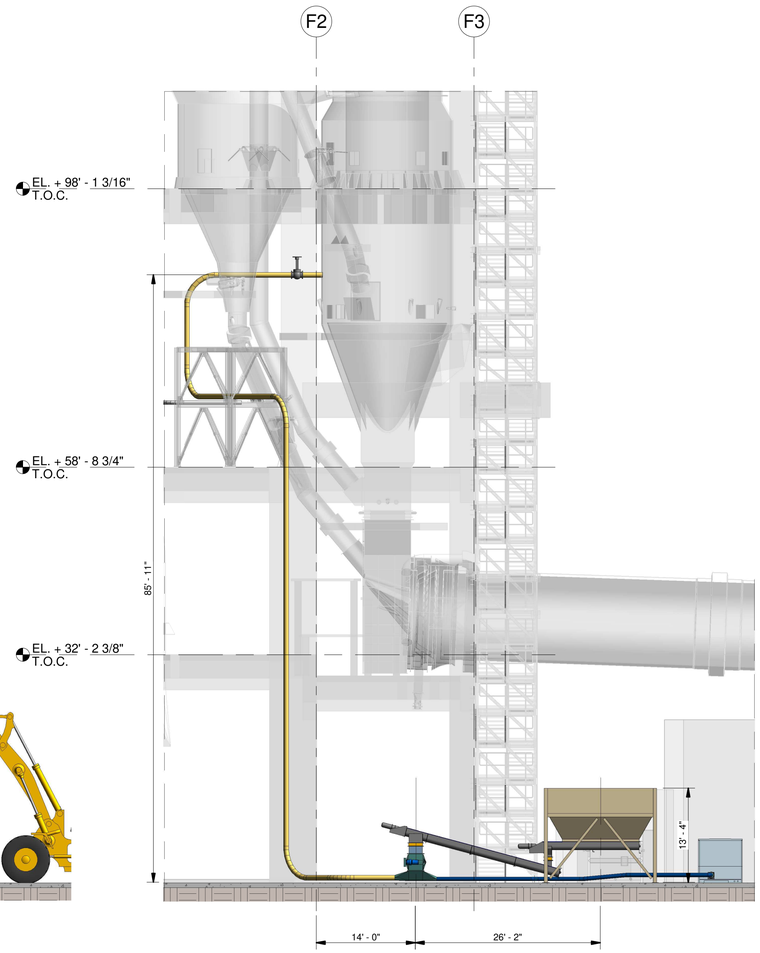
DESIGN	DRAWING	CHECK
RPAZ	MMY	RPAZ

APPROVED	DRAWING No.
RPAZ	M1-01 (OPT 5)

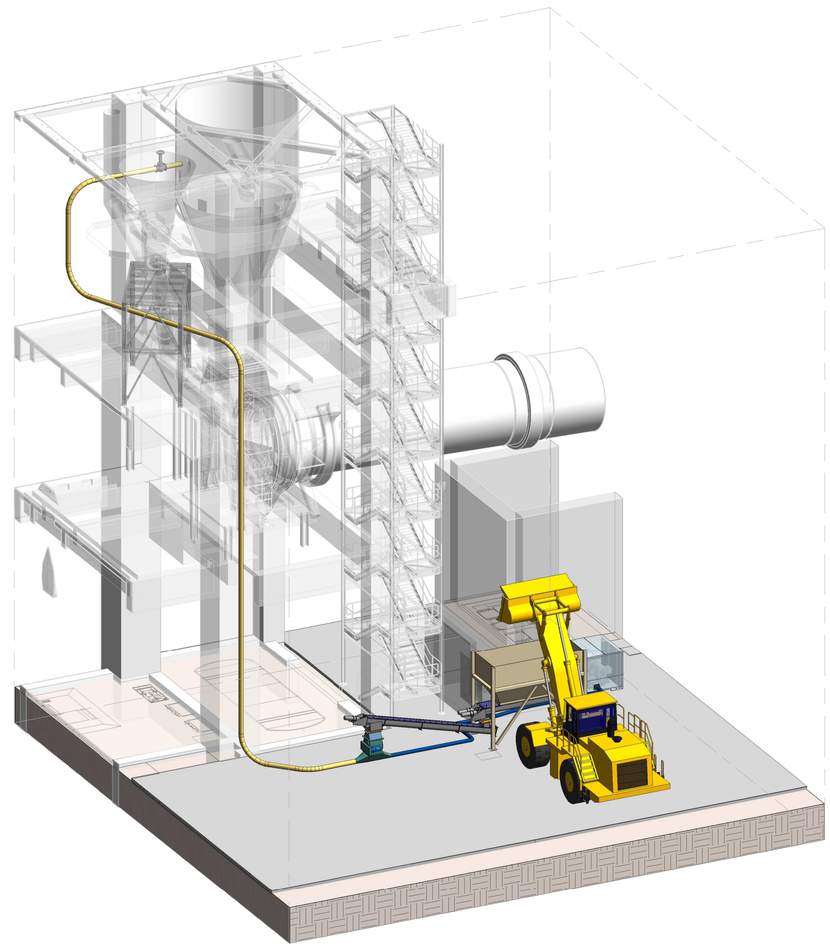
SCALE	DATE	SHEET N°/TO	REV.
AS SHOWN	SEP 2023	1/1	A



VIEW A-A
Scale 1" = 10'-0"



VIEW B-B
Scale 1" = 10'-0"



3D VIEW
Scale

REV. N:	DRAWN:	APPROV:	DATE:	DESCRIPTION

DRAKE **Drake Cement LLC**

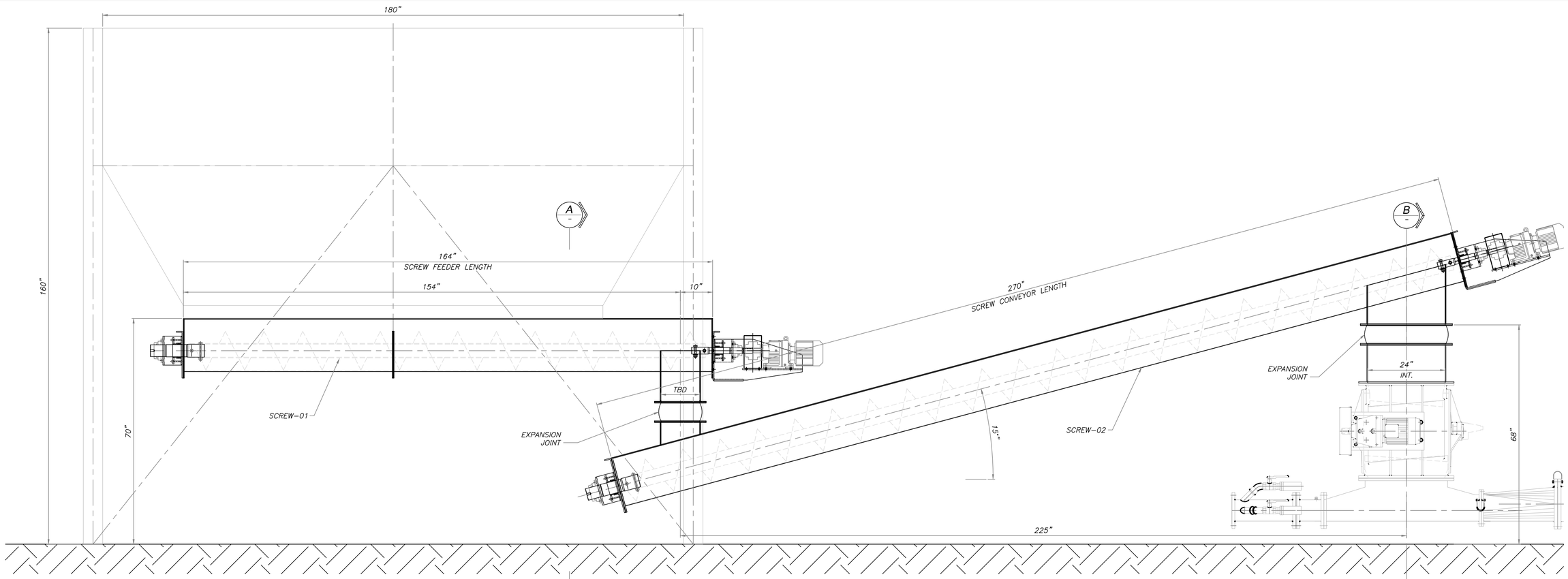
CLIENT: DRAKE CEMENT LLC

TITLE: BIOMASS

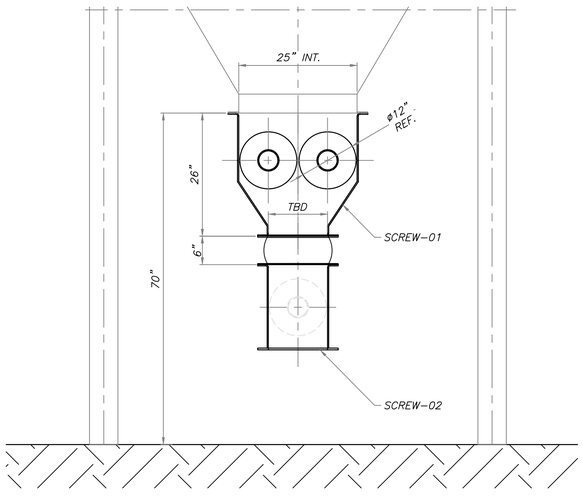
GENERAL ARRANGEMENT

ELEVATIONS AND 3D VIEW – OPTION 5

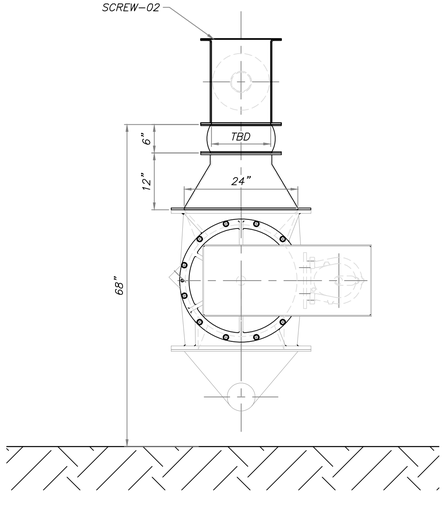
PROJ No.	---	PLANT AREA		EQUIP No	
DESIGN	RPAZ	DRAWING	MMY	CHECK	RPAZ
APPROVED	RPAZ	DRAWING No.	M1-03 (OPT 5)		
SCALE	AS SHOWN	DATE	JAN 2024	SHEET N°/TO	1/1	REV.	



ELEVATION
SCALE: 3/4"=1'



SECTION A-A
SCALE: 3/4"=1'



SECTION B-B
SCALE: 3/4"=1'

SCREW – 01	
TYPE	TWIN SCREW FEEDER
MATERIAL	WOOD CHIPS
LENGTH SCREW	164"
CAPACITY	RANGE 0.6–6 tons/hr
SLOPE	--
DENSITY	15 lb/cuft
MOISTURE	15%
VELOCITY	VARIABLE
TEMPERATURE	ENVEIROMENT
DIAMETER	BY SUPPLIER
% FILL	BY SUPPLIER
PITCH	BY SUPPLIER
POWER	BY SUPPLIER
RPM	BY SUPPLIER

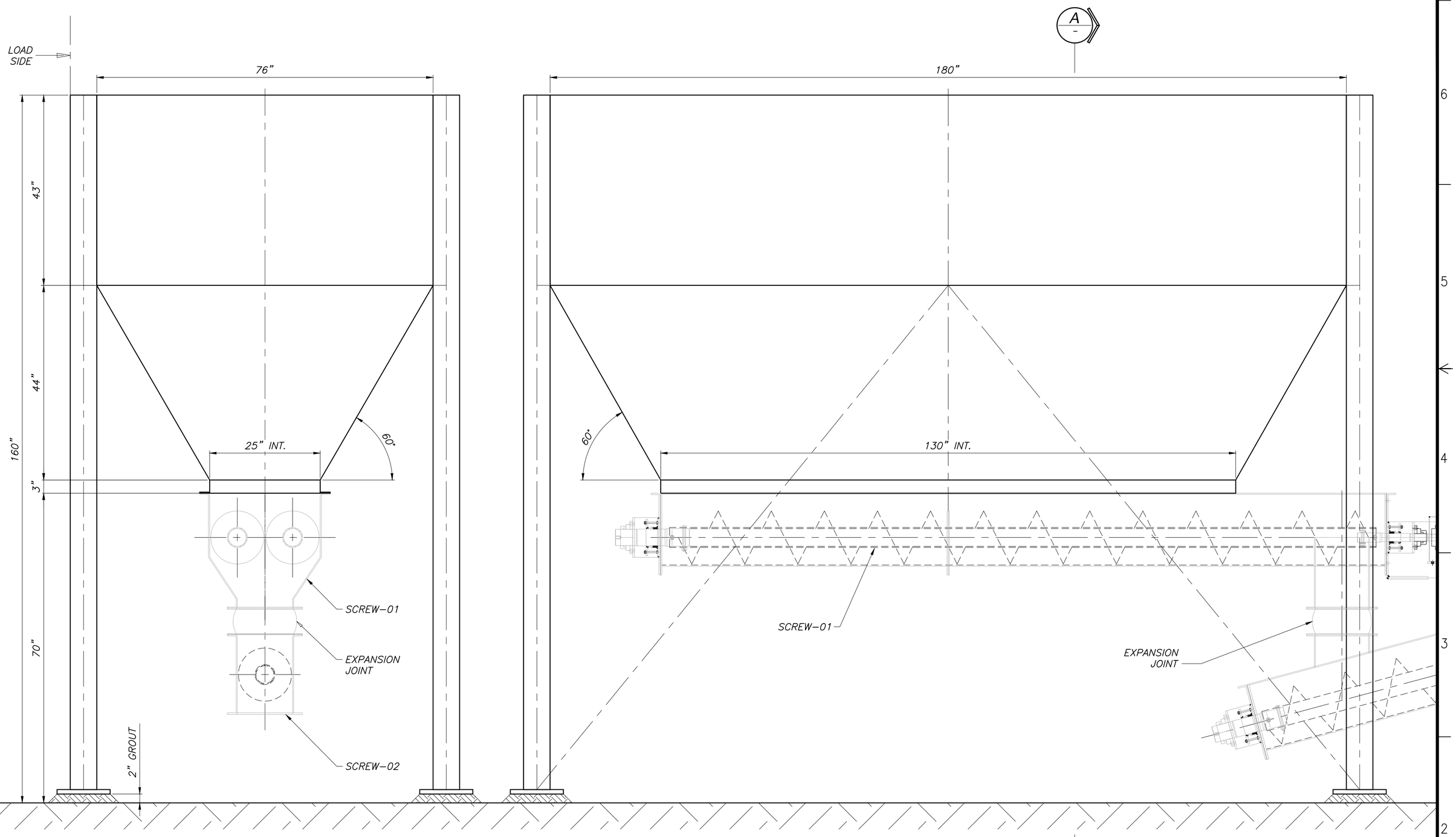
SCREW – 02	
TYPE	SCREW CONVEYOR
MATERIAL	WOOD CHIPS
LENGTH SCREW	270"
CAPACITY	6 tons
SLOPE	15°
DENSITY	15 lb/cuft
MOISTURE	15%
VELOCITY	FIX
TEMPERATURE	--
DIAMETER	BY SUPPLIER
% FILL	BY SUPPLIER
PITCH	BY SUPPLIER
POWER	BY SUPPLIER
RPM	BY SUPPLIER

DRAKE | **Drake Cement LLC**

CLIENT: DRAKE CEMENT

TITLE: BIOMASS
SKETCH
FEEDER SYSTEM

PROJ No. ---	PLANT AREA ALL	EQUIP No --	
DESIGN RPAZ	DRAWING MMY	CHECK MCH	
APPROVED RPAZ	DRAWING No. SKT-01		
SCALE AS SHOWN	DATE JAN 2024	SHEET N°/TO 1/1	REV. A



SECTION A-A
SCALE: 3/4"=1'

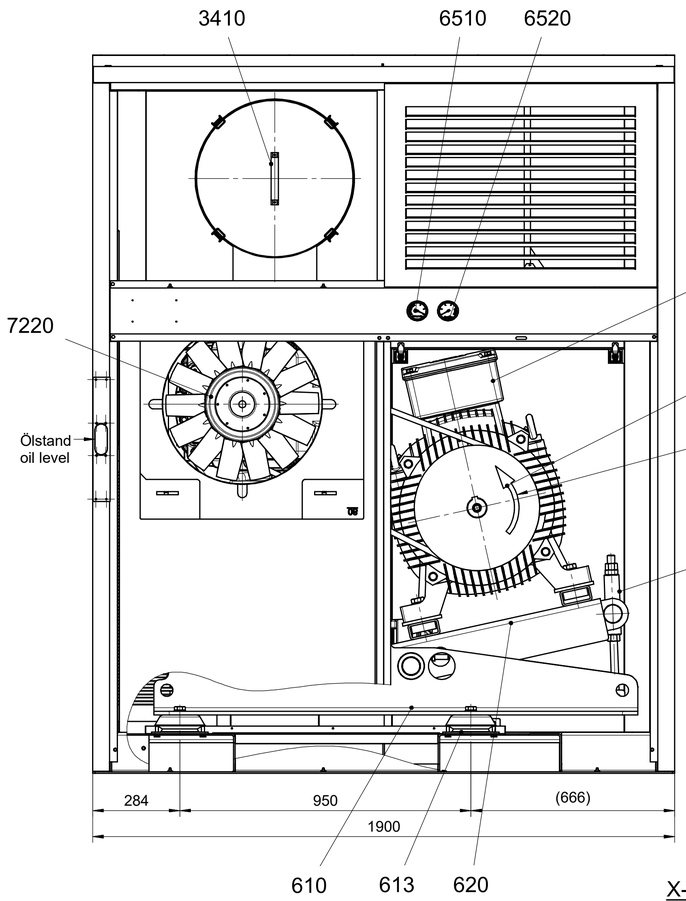
ELEVATION
SCALE: 3/4"=1'

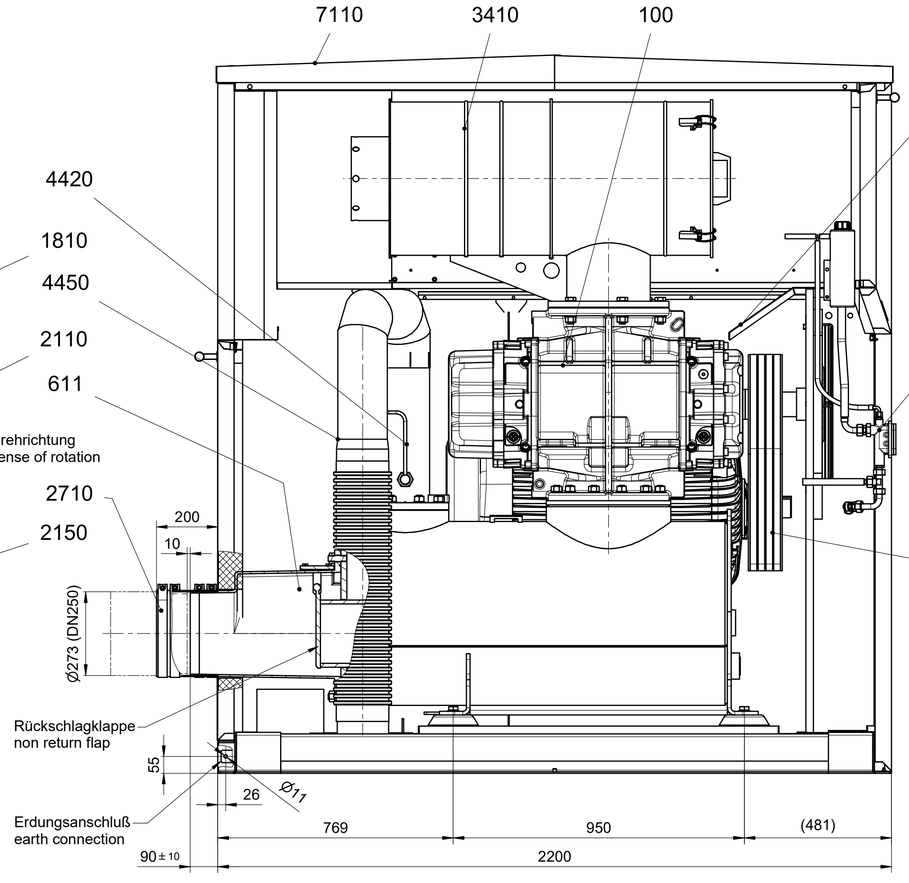
HOPPER	
MATERIAL	WOOD CHIPS
VOLUME	20.4 cu yd

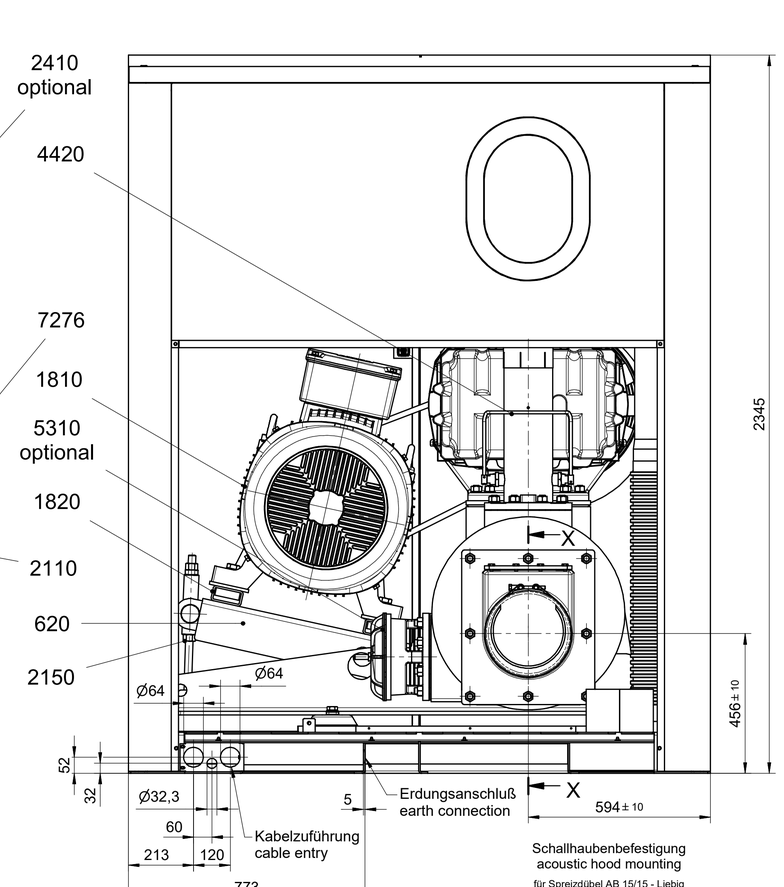
DRAKE	Drake Cement LLC		
CLIENT	DRAKE CEMENT		
TITLE	BIOMASS SKETCH HOPPER		
PROJ No. ----	PLANT AREA ALL	EQUIP No --	
DESIGN RPAZ	DRAWING MMY	CHECK MCH	
APPROVED RPAZ	DRAWING No. SKT-02		
SCALE AS SHOWN	DATE JAN 2024	SHEET N°/TO 1/1	REV. A

OEMs Existing equipment

Drawings

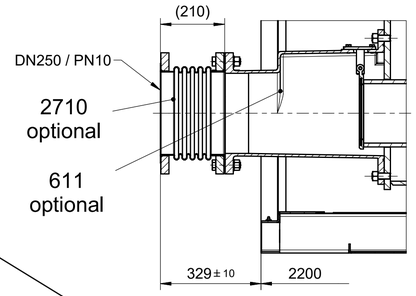




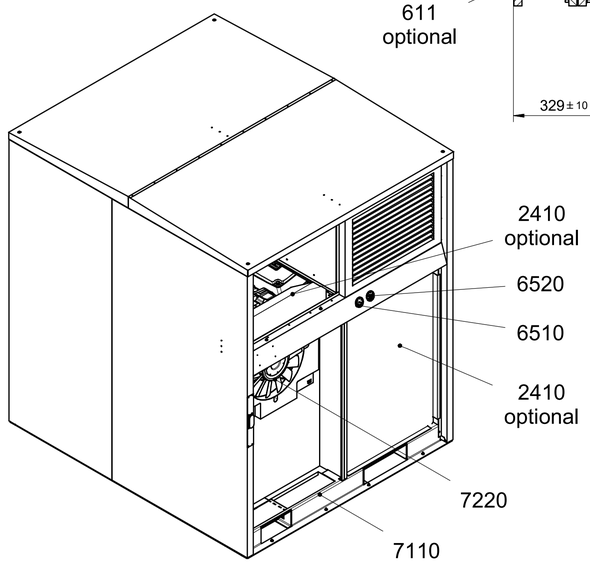


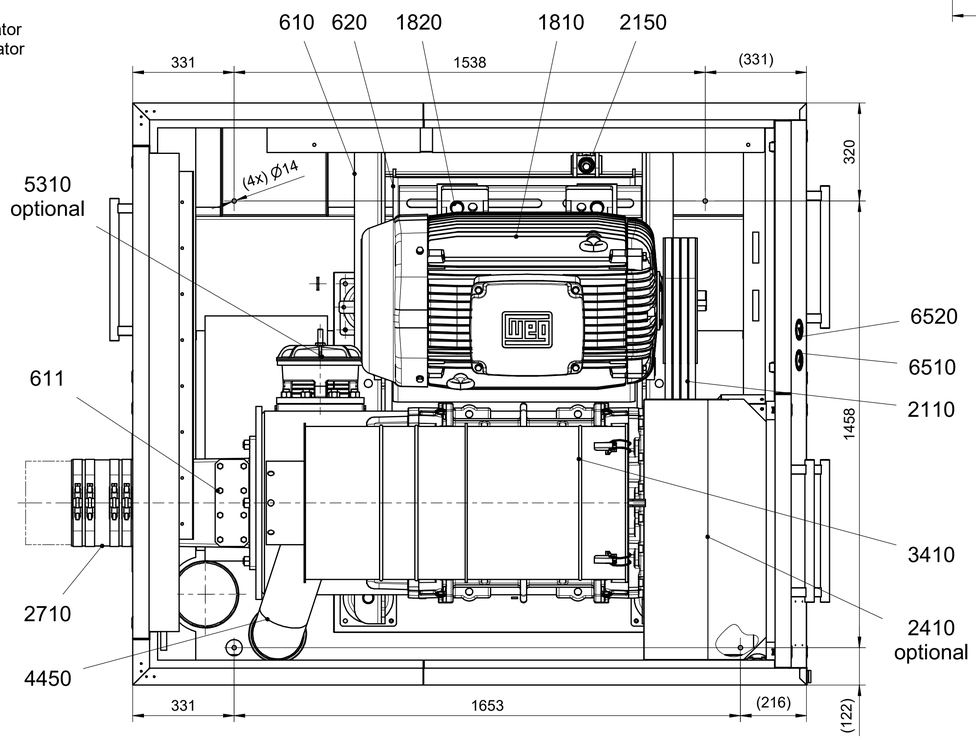
X-X

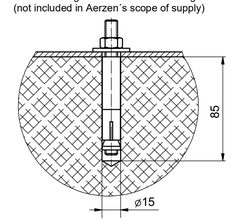
Option Flanschanschluß mit Kompensator
option flange connection with compensator



3D (1 : 20)







Schallhaubenbefestigung
acoustic hood mounting

für Spreizdübel AB 15/15 - Liebig
(nicht Lieferanteil AM)
for straddling dowels AB 15/15 - Liebig
(not included in Aerzen's scope of supply)

7276	Ölstandanzeiger	oil level indicator
7220	Ventilator	fan
7110	Schallhaube	acoustic hood
6520	Manometer	pressure gauge
6510	Wartungsanzeiger	maintenance indicator
5310 optional	Anfahrentlastung	no load starting device (soft start)
4450	Rohrverbindung für Ventil	pipe connection for valve
4420	Druckventil	pressure valve
3410	Filterschalldämpfer	filter silencer
2710 optional	Elastische Rohrverbindung DS + Kompensator	flexible pipe connection DS + compensator
2710	Elastische Rohrverbindung DS + Muffe	flexible pipe connection DS + sleeve
2410 optional	Riemenschutz	belt guard
2150	Hebevorrichtung	lifting device
2110	Riementrieb	belt drive
1820	Motorbefestigung	motor connection
1810	Motor	motor
620	Motorwippe	hinged motor support
613	Elastischer Maschinenfuss	flexible machinery mounting
611	Anschlussgehäuse	connection housing
611 optional	Anschlussgehäuse mit Flansch	connection housing with flange
610	Grundträger	base frame
100	Gebläse	blower
Pos	Beschreibung	description

Alle kundenseitigen Anschlüsse sind spannungs- & momentenfrei zu montieren!
All connections provided by the customer are to be mounted stress-relieved and moment-free!

Freiraum für Wartungsarbeiten Stirnseitig min. 800mm
Free space for maintenance work at front side of unit 800mm min.

Die Fundamentoberfläche muß eben und horizontal sein !
The foundation surface has to be even and horizontal !

AERZEN

Allgemeintoleranzen: ISO 2768-mH, ISO 13920, ISO 8015
Schutzvermerk nach ISO 16016

Maßstab: 1 : 10

Dokumententyp: Aggregatszeichnung

Achtung! Kopie muss nicht maßstäblich sein!

Dokumentenstatus: Fert. Freigabe

Labor/Büro: 110

Inventor - Zeichnung
Änderung nur mittels Inventor !

VsÄ-Nr.	Datum	Name		Datum	Name
02\102360	20.08.18	FUCHS	Erstellt durch:	20.08.2018	FUCHS_T
01	26.03.15	WALLB	Genehmigt von:	20.08.2018	SEEDORFF_S

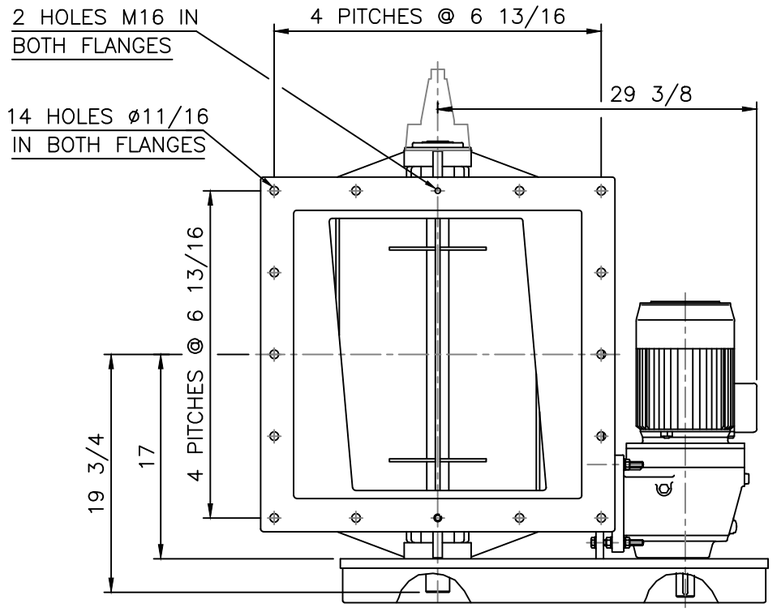
Änderungs-Nr: 000000102360

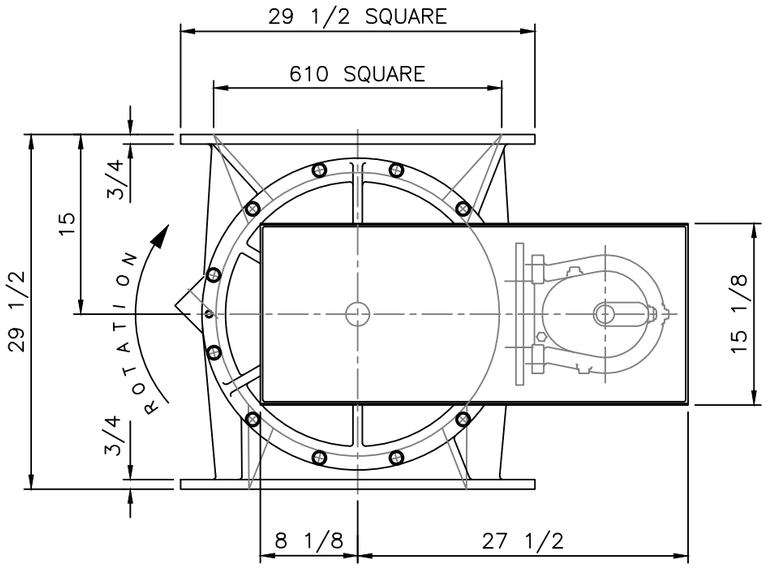
Alte Dokument-Nr:

Delta Blower
DN250 Filteransaugung mit SH
GM80L | GM90S

4000165787	000	Version 02	Format A1	Sprache DE	Blatt 1

IF IN DOUBT ASK



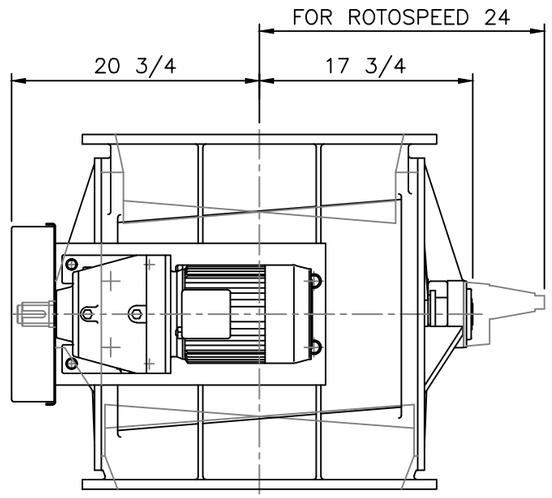


OPTIONS

1. FOR EXPOSED INLET OR OUTLET SAFETY GUARDS ARE REQUIRED.
2. 2 OFF 1 1/2" NPT (OR BSP) BODY VENT ON NON–DRIVE SIDE.
3. 1/8" NPT (OR BSP) AIR PURGED END COVER GLANDS.
4. ROTOSPEED SENSOR AS INDICATED.
5. INSPECTION DOOR ON NON–DRIVE SIDE (NOT SHOWN) WITH 23" x 4 1/2" APERTURE.

NOTES

1. OPPERMAN TDM20 3 HP (2.2KW) GEARMOTOR.



AS BUILT
IAC SYSTEMS, INC.
MISSION, KS

ITEM	PART No.	QTY	DESCRIPTION	MATL.	DWG REF

D	OPTIONS & ROTOSPEED ADDED (1442)
C	GUARD BACKPLATE WAS CHANGED. (473)
B	IMPERIAL EQUIVALENT INLET (266)

AMENDMENTS

ROTOLOK

ROTOLOK VALVES INC.
2711 GRAY FOX ROAD
MONROE, NC 28110

CLIENT
MOTORISED STANDARD

SCALE N.T.S.

DRAWN	CHECKED	APPROVED
SB		
5/1/94		

TITLE
GENERAL ARRANGEMENT
24" SQUARE ROTARY VALVE

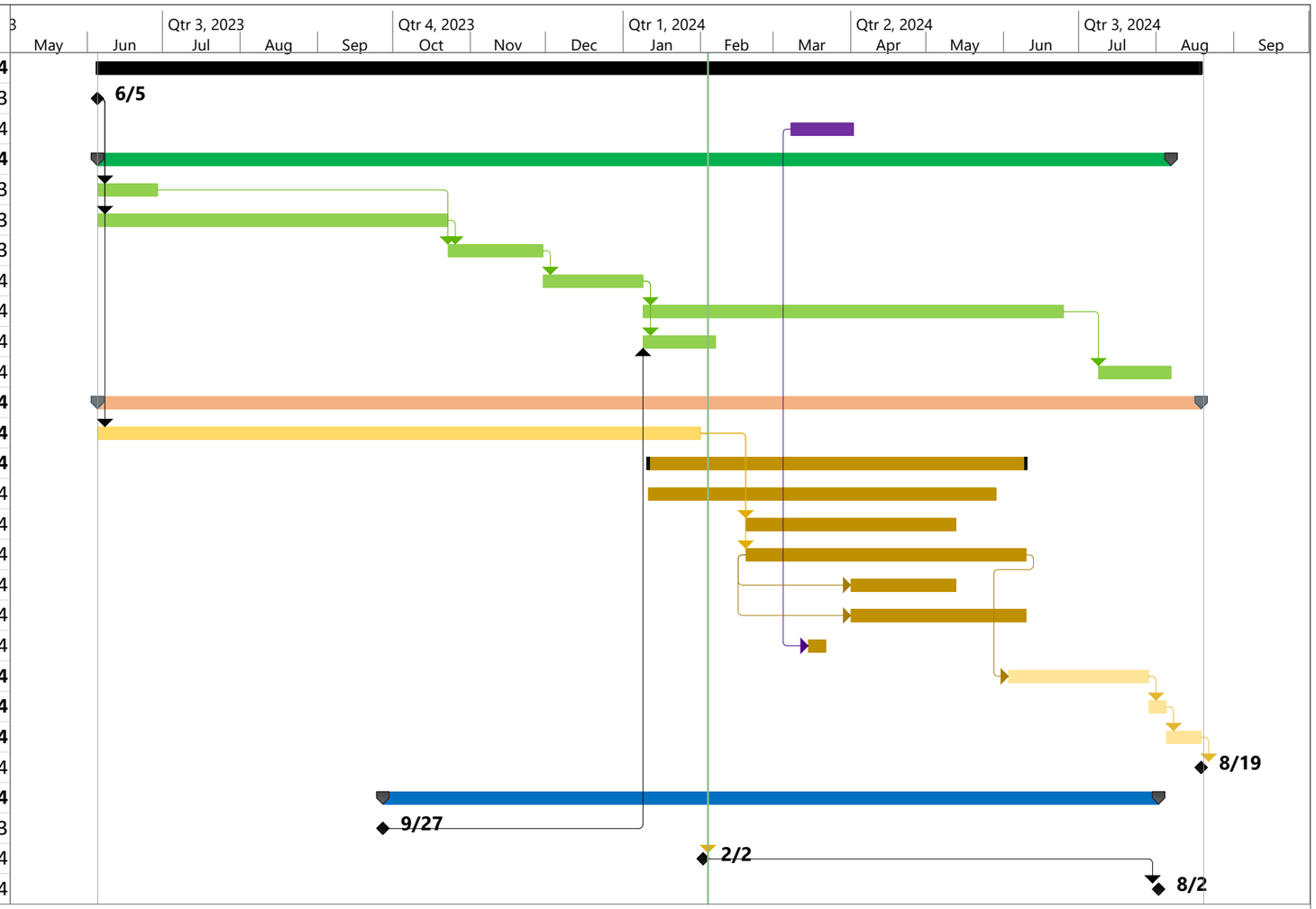
DRAWING No.
10547

ISSUE D

DRAKE CEMENT

PROJECT SCHEDULE

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Biomass Project 02.04.2024**	**63 wks**	**6/5/23**	**8/19/24**
2		Kick off meeting	0 wks	6/5/23	6/5/23
3		KSD 2024 start	17 days	3/8/24	4/2/24
4		**Biomass Sourcing**	**61.4 wks**	**6/5/23**	**8/7/24**
5		Game & Fish engagements	18 days	6/5/23	6/29/23
6		Prescott National Forrest engagements	100 days	6/5/23	10/23/23
7		Bid out	28 days	10/23/23	11/30/23
8		Award	28 days	11/30/23	1/9/24
9		Mobilization, prepardeness	120 days	1/9/24	6/25/24
10		Mob/demob cutting south area	21 days	1/9/24	2/7/24
11		Ready to cut, full scale	21 days	7/9/24	8/7/24
12		**Drake Execution**	**63 wks**	**6/5/23**	**8/19/24**
13		**Front-end Engineering design (FEED)**	**173 days**	**6/5/23**	**2/1/24**
14		**Procurement**	**21.4 wks**	**1/11/24**	**6/10/24**
15		Blower	99 days	1/11/24	5/29/24
16		Rotary Valve	60 days	2/19/24	5/13/24
17		Screw feeder & screw conveyor	16 wks	2/19/24	6/10/24
18		Fabrications	6 wks	4/1/24	5/13/24
19		Electrical panels	10 wks	4/1/24	6/10/24
20		Pneumatic pipe & gate verification	1 wk	3/15/24	3/22/24
21		**Construction**	**8 wks**	**6/3/24**	**7/29/24**
22		**Commissioning**	**1 wk**	**7/29/24**	**8/5/24**
23		**ADEQ pilot program**	**2 wks**	**8/5/24**	**8/19/24**
24		Full scale burning commencement	0 days	8/19/24	8/19/24
25		**Permit**	**44.4 wks**	**9/27/23**	**8/2/24**
26		PNF South area permit approval	0 days	9/27/23	9/27/23
27		ADEQ Permit application	0 days	2/2/24	2/2/24
28		ADEQ Permit granted	0 days	8/2/24	8/2/24



Project: Biomass Schedule 2 01
Date: 2/4/24

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

SILT ANALYSIS

Date: 4-23-24 By: Stephen Rodriguez

Sample No: 1 of 4
Material: wood chips

Make Ohaus
Smallest Division 0.01g

Sample Weight (after drying)
Pan + Sample: 658.04g
Pan: 503.54g
Split Sample Balance:
Dry Sample: 154.50g
Capacity: 6000g
Final Weight: 156.98g
Net Weight <200 Mesh 6.68g
% Silt = Total Net Weight x 100 = % 4.26%

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	503.54g
10 min:	506.96g
20 min:	508.52g
30 min:	509.36g
40 min:	510.22g

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.	—	—	—	
4 mesh	—	—	—	
10 mesh	—	—	—	
20 mesh	570.32g	582.20g	11.88g	7.57
~~40~~ mesh 30	608.74g	624.46g	15.72g	10.01
~~100~~ mesh 50	566.72g	624.36g	57.64g	36.72
~~140~~ mesh 100	531.60g	579.52g	47.92g	30.53
200 mesh	327.26g	344.40g	17.14g	10.92
Pan	503.54g	510.22g	6.68g	4.26

Figure C.2-4. Example silt analysis form.