Air Quality Construction Permit Application Form

Lincoln-Lancaster County Health Department
Environmental Public Health Division - Air Quality Program
Lincoln, NE 68510
ph: (402) 441-8040 fax: (402) 441-3890
http://www.lincoln.ne.gov/city/health/environ/air.htm

Purpose of Application:

- ☑ Initial Construction Permit
- ☐ Construction Permit Modification
- ☐ Establish Facility-Wide Limits
- ☐ Revise Previously Submitted Application

SECTION 1: ADMINISTRATIVE INFORMATION AND RESPONSIBLE OFFICIAL CERTIFICATION

Part A: Company Information

Company Name:	City of Lincoln - Transportation and Utilities Department				
Company Address:	5101 North 48th Street				
Company City:	Lincoln	**Company State:**	Nebraska	**Company ZIP:**	68504
Is the business incorporated?	☐ Yes ☑ No				

Part B: General Facility Information

Facility Name:	North 48th Street Solid Waste Management Facility				
LLCHD Facility ID #:	00235				
Facility Physical Address:	5101 North 48th Street				
Facility City:	Lincoln	**Facility State:**	Nebraska	**Facility ZIP:**	68504
Facility NAICS Code(s):	562212	Solid Waste Landfill			
Is the facility located within 50 miles of another state?	☑ Yes ☐ No	**If so, which state(s)?**	☑ Iowa ☐ Kansas ☑ Missouri		
Is the facility located on leased property?	☐ Yes ☑ No				

Part C: Contact Information

Facility Contact Person:	Karla M. Welding		
Facility Contact Person Title or Responsibility:	Superintendent of Solid Waste Operations		
Phone Number:	402-441-7867	**E-Mail:**	kwelding@lincoln.ne.gov
Alternate Phone Number: *(optional)*		**Fax Number:** *(optional)*	
Who is the primary contact for questions regarding this application?	☑ Facility Contact Person ☐ Other		

SECTION 1: ADMINISTRATIVE INFORMATION AND RESPONSIBLE OFFICIAL CERTIFICATION

Part D: Permit Information		
Does this facility currently hold an operating permit issued by the LLCHD?	☑ Yes	☐ No
If so, what type of operating permit does the facility hold?	☑ Class I (Title V) - Major Source ☐ Class II - Synthetic Minor Source	☐ Class II - Minor Source
What is the expiration date of the operating permit you currently hold?	1/1/2023	
Does this facility currently hold one or more construction permits issued by the LLCHD?	☐ Yes	☑ No
If you know what type of permit you are applying for, check the appropriate box:	☐ PSD Construction Permit ☑ Non-PSD (Minor NSR) Permit	☐ PSD Avoidance Permit ☐ I do not know permit type.

Part E: Responsible Official Certification	
Compliance Certification ☑ **Agree** ☐ **Disagree**	I hereby certify that, based on information and belief formed after reasonable inquiry, the facility that emits air pollutants, which is identified in this application and that is subject to the applicable requirements identified in Section 9: 1. Is in compliance with all applicable requirements, except as described in Section 9; 2. Will continue to comply with all applicable requirements for which compliance has been achieved; and, 3. Will comply with all applicable requirements for which compliance is not currently achieved
Truth and Accuracy Certification ☑ **Agree** ☐ **Disagree**	I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this Air Quality Construction Permit application are true, complete, and accurate. I certify that all hard copies of this application are identical in content.
Electronic Copy Certification ☑ **Agree** ☐ **Disagree** ☐ **Not Applicable**	I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in the electronic copy of the Air Quality Construction Permit application are identical in content to the hard copy submittal.
Citizenship Attestation ☑ **Agree** ☐ **Disagree**	For the purpose of complying with Neb: Rev. Stat. §§4-108 through 4-114, I attest as follows *(check one)*: ☑ **I am a citizen of the United States.** OR ☐ **I am a qualified alien under the federal Immigration and Nationality Act, and will provide my immigration status, alien number, and USCIS documentation upon request.** I hereby attest that my responses and the information provided on this form and any related application for public benefits are true, complete, and accurate, and I understand that this information may be used to verify my lawful presence in the United States.
Responsible Official Name: (printed or typed)	Elizabeth Elliott
Responsible Official Title:	Director, Department of Transportation and Utilities
Responsible Official Signature:	Elizabeth Elliott
Date:	03/19/2024

SECTION 2: DETAILED SOURCE INFORMATION

Part A: Operating Schedule

Is this source operated seasonally, or year-round?	☐ **Seasonal** ☑ **Year-Round**	
Provide the normal operating schedule:	**Hours per Day:**	**11.25**
	Days per Week:	**7**
	Weeks per Year:	**52**
Does the source operate under an alternative schedule on a regular basis?	☐ **Yes** ☑ **No**	

Part B: New Process Description

On separate sheet(s) of paper, provide a detailed narrative description of the process or equipmen you are planning to construct/reconstruct/modify. Explain the stages in each process that may result in the discharge of an air pollutant. Include all emission points, emission units, pollution control equipment, and identification numbers. The narrative should complement the facility layout and process flow diagrams.

Is a New Process Description attached to your application?	☑ **Yes** ☐ **No**	

Part C: Process Layout Diagram

On a separate sheet(s) of paper, provide a detailed diagram or drawing that includes all processes and/or equipment identified in this application. Make sure all elements in the drawing are properly identified, drawn to scale, and consistent with other sections of this application. The diagram should show the location of all new/modified buildings, structures, stacks, and property boundaries. Fences or other public access restrictions should be shown or identified and described. Be sure to identify adjacent roads and include a north arrow. Include an effective date for the diagram.

Is a Process Layout Diagram included with your application?	☑ **Yes** ☐ **No**	

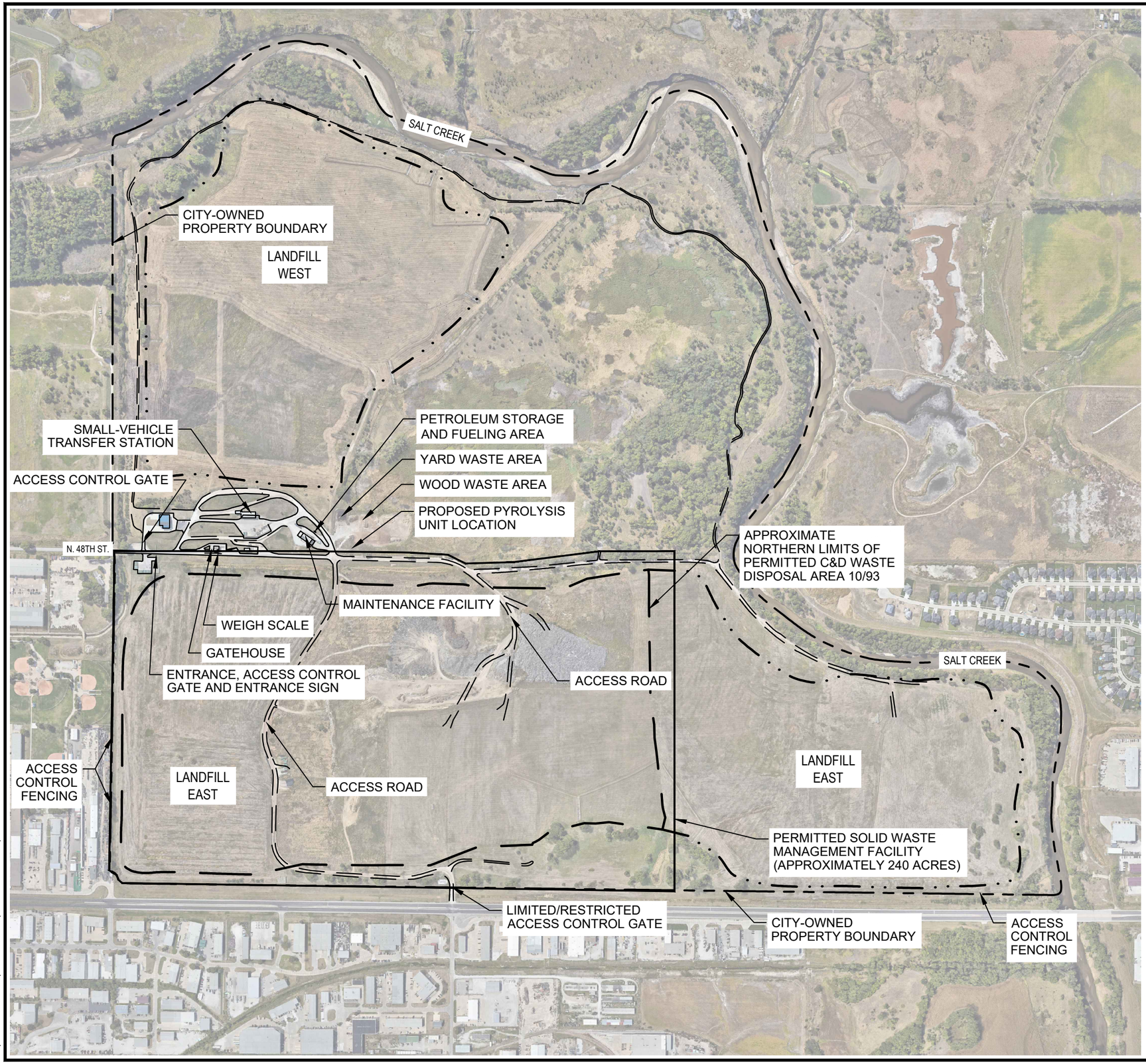
Part D: Facility Description

On separate sheet(s) of paper, provide a brief narrative description of the facility. Explain the stages in each process that may result in the discharge of an air pollutant. Include all emission points, emission units, pollution control equipment, and identification numbers. The narrative should complement the facility layout and process flow diagrams.

Is a Facility Description included with your application?	☑ **Yes** ☐ **No**	

Figure 1 - Site Layout

Figure 2 – Pyrolysis Process Layout



GENERAL LEGEND:

- APPROXIMATE LIMITS OF HISTORIC LANDFILL OPERATIONS
- CITY-OWNED PROPERTY BOUNDARY
- ROADWAYS
- LIMITS OF C&D WASTE LANDFILL
- PERMITTED SOLID WASTE MANAGEMENT FACILITY

750 0 750 1500

SCALE FEET

REV.	DATE	CK. BY
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1	-	-
2	-	-
3	-	-
4	-	-
5	-	-

SHEET TITLE: SITE LAYOUT

PROJECT TITLE: PYROLYSIS UNIT CONSTRUCTION PERMIT APPLICATION

CLIENT: CITY OF LINCOLN
NORTH 48TH STREET SOLID WASTE MANAGEMENT FACILITY
LINCOLN, NEBRASKA

SCS ENGINEERS
14755 Grover Street
Omaha, NE 68144
PH: (402) 964-6202 FAX: (913) 681-0012

PROJ. NO. 27224038.04
DSN. BY: BSG
DWN. BY: BSG
CHK. BY: DBT
PROJ. MGR: ZEM

CADD FILE: SITE LAYOUT DIAGRAM V0.0.DWG

DATE: 3/15/24

DRAWING NO. 1

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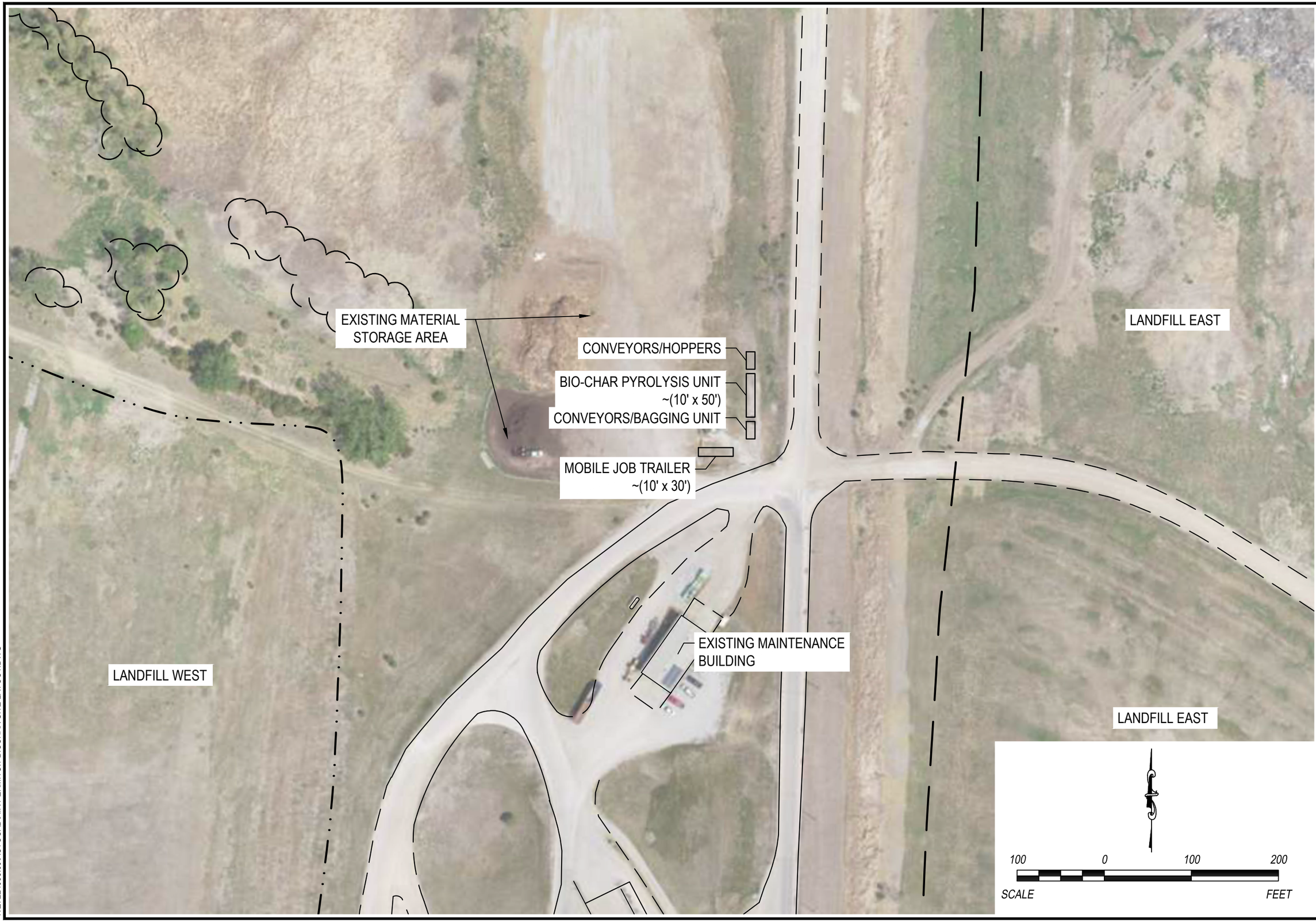

REV.	DATE	CK BY
1	-	-
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4	-	-
5	-	-
6	-	-

SHEET TITLE
PYROLYSIS PROCESS LAYOUT

PROJECT TITLE
PYROLYSIS UNIT CONSTRUCTION PERMIT APPLICATION

CLIENT
CITY OF LINCOLN
NORTH 48TH STREET SOLID WASTE MANAGEMENT FACILITY
LINCOLN, NEBRASKA

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PROJ. NO.	DWN. BY:	PROJ. MGR
27224038.04	BSG	ZEM
DSN. BY:	CHK. BY:	
ZEM	DBT	

CADD FILE:
1 BIOCHAR SITE LAYOUT.DWG

DATE:
3/15/24

DRAWING NO.
2

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SECTION 2: DETAILED SOURCE INFORMATION

Part E: Emission Calculations

Indicate which method(s) will be used to calculate emissions: (check all that apply)

☑ **AP-42 or WebFIRE Emission Factors**	
☑ **Emission Factors from Stack Testing ***	
☐ **Material Mass-Balance Calculations ***	
☑ **Other** (specify >>>>) *	EPA LandGEM v3.03 Model
☐ **Other** (specify >>>>) *	
☐ **Other** (specify >>>>) *	

If using emission factors or calculation methods other than those provided in AP-42 or WebFIRE, attach a copy of any alternate emission factors (including stack test results) and/or emission calculations as an attachment to this application.

Indicate how material and/or fuel use will be substantiated:

☐ **Material / Fuel Supplier Record(s)**	
☑ **Material / Fuel Use Logbook(s)**	
☐ **Receiving / Load-Out Scale Tickets**	
☐ **Other** (specify >>>>)	
☐ **Other** (specify >>>>)	
☐ **Other** (specify >>>>)	

SECTION 3 – EMISSION UNIT SUMMARY

Table 3-A: New/Modified/Reconstructed Emission Unit Identification

Emission Unit #		Source Classification Code # (SCC)	Emission Point Description	Emission Segment Description
Point #	Segment #			
			See Appendix B	

SECTION 3 – EMISSION UNIT SUMMARY

Table 3-B: New/Modified/Reconstructed Stack / Release Point Information

** Stack information not required for fugitive sources.*

Emission Unit #	Associated Emission Unit	Latitude (decimal deg.)	Longitude (decimal deg.)	Elevation (feet a.s.l.)	Stack Height (feet)	Stack Inside Diameter (feet)	Exhaust Temp. (°F)	Exhaust Exit Velocity (feet/sec)	Exhaust Flow Rate (cu. feet/sec)	Vertical, Horizontal, or Fugitive	Raincap Present?
	See Appendix B										

SECTION 4 – INSIGNIFICANT ACTIVITIES

Table 4-A: Insignificant Activities List

Insignificant Activity Type	Description of Insignificant Activity
Three (3) comfort heaters	Propane; 175,000 Btu/hr each
Comfort heater	Propane; 40,000 Btu/hr
Diesel Tank	1,500 gal
Two (2) Propane Tanks	1,000 gal each

SECTION 4 – INSIGNIFICANT ACTIVITIES

Table 4-B: Insignificant Lubricating and Heavy Oil Storage Information

Storage ID	Installation Date	Tank/Vessel Contents	Maximum Capacity (gallons)	Vapor Pressure @ Standard Conditions (psi)
		Used Oil	2,000	
		Used Oil	350	

SECTION 5 – MAXIMUM POTENTIAL TO EMIT (MPTE)

Table 5-A: New/Modified/Reconstructed Emission Units MPTE – Regulated Air Pollutant Emissions

Please list maximum potential emissions of all pollutants for each emission unit in pounds per year.

Emission Unit #	SCC Code	Hourly Process Rate	Process Rate Units	Max Annual Throughput	Emission Factor Source	PM_{10}	$PM_{2.5}$	NOx	SOx	VOC	CO	GHGs (CO_2e)	LEAD	Total HAP
		See App B												

SECTION 5 – MAXIMUM POTENTIAL TO EMIT (MPTE)

Table 5-E: Maximum Potential to Emit and Construction Permit Thresholds

Criteria Air Pollutants	Emissions (tons per year)	Construction PermitThreshold (tons per year)	Meet or Exceed?	PSD Permit Threshold (tons per year)	Meet or Exceed?
PM_{10}	0.00	15.0	No	15.0	No
$PM_{2.5}$	0.00	10.0	No	10.0	No
NOx	0.00	40.0	No	40.0	No
SOx	0.00	40.0	No	40.0	No
VOC	0.00	40.0	No	40.0	No
CO	0.00	50.0	No	100.0	No
Lead	0.00	0.6	No	0.6	No
Hazardous Air Pollutants	**Emissions (tons per year)**	**Const. Permit & Toxic BACT Threshold (tons per year)**	**Meet or Exceed?**	**Toxic MACT Threshold (tons per year)**	**Meet or Exceed?**
Greatest Single HAP	0.00	2.5	No	10.0	No
Total Combined HAP	0.00	10.0	No	25.0	No

SECTION 5 – MAXIMUM POTENTIAL TO EMIT (MPTE)

Table 5-E: Maximum Potential to Emit and Construction Permit Thresholds

PSD-Only Pollutants	Emissions (tons per year)	Construction PermitThreshold (tons per year)	Meet or Exceed?	PSD Permit Threshold (tons per year)	Meet or Exceed?
PM	0.00			25.0	No
Fluorides	0.00			3.0	No
Sulfuric Acid Mist (H_2SO_4)	0.00			7.0	No
Hydrogen Sulfide (H_2S)	0.00			10.0	No
Total Reduced Sulfur Compounds (including H_2S)	0.00			10.0	No
GHGs	0.00				

PSD-Only Pollutants	Emissions (megagrams per year)	Construction PermitThreshold (tons per year)	Meet or Exceed?	PSD Permit Threshold (megagrams per year)	Meet or Exceed?
Municipal Waste Combustor Organics	0.00E+00			3.20E-06	No
Municipal Waste Combustor Metals	0.00			14.0	No
Municipal Waste Combustor Acid Gases	0.00			36.0	No
Municipal Solid Waste Landfill Emissions	0.00			45.0	No

SECTION 6: CONSTRUCTION PERMIT DETERMINATION

Part A: Current Source Classification		
The potential to emit (PTE) is below all applicable permitting thresholds, and no construction permit is necessary.		
	☐	☐
	☐	☐
Part B: Construction Permit Determination		
	☐	☐
Part C: Toxic 'Best Available Control Technology' (T-BACT) Determination		
	☐	☐
Part D: Toxic 'Maximum Achievable Control Technology' (MACT) Determination		
	☐	☐

Part E: Source Elected Requirements for Actual Emission Reductions		
	☐	☐

SECTION 6 – CONSTRUCTION PERMIT DETERMINATION

Table 6-A: Source-Elected Throughput Limits and Emission Control Requirements

In the table below, indicate which emission units you will either accept throughput limits on, or to which you will agree to apply control equipment.

Emission Unit #	SCC Code	Agree to Throughput Limit?	Maximum Annual Throughput	Annual Throughput Limit	Throughput Units	Agree to Emission Controls?	Control Device ID	Control Type	If 'Other', Specify Type

SECTION 6 – MAXIMUM POTENTIAL TO EMIT (MPTE)

Do you wish to accept facility-wide emission limits as part of this construction permit? If "Yes", enter the limit(s) in units of pounds. For pollutants with no limit, enter zero (0).	☐ Yes ☐ No	PM_{10}	$PM_{2.5}$	NOx	SOx	VOC	CO	GHGs (CO_2e)	LEAD	Individual HAP	Total HAP

Do you wish to accept emission limits that will apply to all of the emission units listed in Table 3-A as part of this construction permit? If "Yes", enter the limit(s) in units of pounds. For pollutants with no limit, enter zero (0).	☐ Yes ☐ No	PM_{10}	$PM_{2.5}$	NOx	SOx	VOC	CO	GHGs (CO_2e)	LEAD	Individual HAP	Total HAP

Air Quality Construction Permit Application Form
Lincoln-Lancaster County Health Department

SECTION 6 – MAXIMUM POTENTIAL TO EMIT (MPTE)

Table 6-B: Source-Elected Emission Limits

If you would like to accept unit-specific emission limits as part of your construction permit, check the box for "Yes" for every unit you wish to apply unit-specific limits, and enter the limit you agree to accept in units of pounds. For pollutants with no limit, enter zero (0).

Emission Unit #	SCC Code	Agreed to throughput limits or controls?	Agree to emission limit?	PM_{10}	$PM_{2.5}$	NOx	SOx	VOC	CO	GHGs (CO_2e)	LEAD	Individual HAP	Total HAP

SECTION 7 – ACTUAL POTENTIAL TO EMIT (APTE)

Table 7-E: Actual Potential to Emit and Construction Permit Thresholds

Criteria Air Pollutants	Emissions (tons per year)	Construction PermitThreshold (tons per year)	Meet or Exceed?	PSD Permit Threshold (tons per year)	Meet or Exceed?
PM_{10}	0.00	15.0	No	15.0	No
$PM_{2.5}$	0.00	10.0	No	10.0	No
NOx	0.00	40.0	No	40.0	No
SOx	0.00	40.0	No	40.0	No
VOC	0.00	40.0	No	40.0	No
CO	0.00	50.0	No	100.0	No
Lead	0.00	0.6	No	0.6	No

Hazardous Air Pollutants	Emissions (tons per year)	Const. Permit & Toxic BACT Threshold (tons per year)	Meet or Exceed?	Toxic MACT Threshold (tons per year)	Meet or Exceed?
Greatest Single HAP	0.00	2.5	No	10.0	No
Total Combined HAP	0.00	10.0	No	25.0	No

SECTION 8: APPLICABLE RULES AND REQUIREMENTS

PART A: Applicable Requirements of the LLCAPCPRS

Applicable requirements for your source may include maintaining allowable stack opacity, maintaining allowable particulate emissions for the total given heat input, adhering to fugitive dust regulations, adhering to the process weight/particulate emissions rates, adhering to all construction permit conditions, etc. In the boxes below, check all of those requirements in the LLCAPCPRS that may apply to your source, and identify the method by which you intend to demonstrate compliance with the requirement. If a requirement does not apply to your source, briefly explain the reason it does not apply.

Requirement Citation & Name	Does standard apply?	If "Yes", describe compliance method. If "No", explain reason it does not apply.
LLCAPCPRS Article 2, Section 18: New Source Performance Standards (40 CFR Part 60)	☑ Yes ☐ No	Describe compliance with each applicable NSPS in Part B, below.
LLCAPCPRS Article 2, Section 19: Prevention of Significant Deterioration (PSD) of Air Quality	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 20, paragraph (A)(1): Particulate Emission Stds. for Incinerators & Burn-Ovens	☑ Yes ☐ No	Compliance will be achieved via an after-burner
LLCAPCPRS Article 2, Section 20, paragraph (B): Particulate Emission Stds. for Combustion Units >10,000 & <10 MMBtu	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 20, paragraph (C): Particulate Emission Stds. for Combustion Units <10,000 & >10 MMBtu	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 20, paragraph (E): <20% Opacity of Visible Emissions	☑ Yes ☐ No	NSPS Requirement
LLCAPCPRS Article 2, Section 20, Table 20-1: Process Weight Rate Particulate Emission Stds.	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 22, paragraph (A)(14): Standards for Pathological Material Incinerators	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 22, paragraph (C): Standards for Air Curtain Incinerators	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 23: Hazardous Air Pollutants - Emission Standards (40 CFR Part 61)	☐ Yes ☑ No	If none apply, in Part C, list any that 'appear' to apply, but do not actually apply.
LLCAPCPRS Article 2, Section 24: Sulfur Compound Emissions - Existing Sources - Emission Standards	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 25: Nitrogen Oxides - Emission Standards for Existing Stationary Sources	☐ Yes ☑ No	Not applicable
LLCAPCPRS Article 2, Section 26: Acid Rain (40 CFR Parts 72 through 78)	☐ Yes ☑ No	If none apply, in Part C, list any that 'appear' to apply, but do not actually apply.
LLCAPCPRS Article 2, Section 27: Hazardous Air Pollutants - Maximum Achievable Control Technology (MACT)	☐ Yes ☑ No	If none apply, in Part C, list any that 'appear' to apply, but do not actually apply.
LLCAPCPRS Article 2, Section 28: MACT Emission Standards (40 CFR Part 63)	☐ Yes ☑ No	If none apply, in Part C, list any that 'appear' to apply, but do not actually apply.
LLCAPCPRS Article 2, Section 32: Dust - Duty to Prevent the Escape Of	☐ Yes ☑ No	Not applicable

PART B: Applicable Federal Regulations and Additional Applicable LLCAPCPRS

APPLICATION COMPLETENESS CHECKLIST

Does this application contain confidential information?	☐ Yes ☑ No	**If "Yes" are application pages containing confidential data clearly marked?**	☑ Yes ☐ No
Continue with the remainder of the checklist.			
Will your source require a PSD construction permit?			☐ Yes ☑ No
Continue with the remainder of the checklist, and submit the original signed copy of the permit application when complete.			

Section Number & Name	Included With Application?	If not included, provide reason.
Section 1: Administrative Information And Responsible Official Certification	☑ Yes ☐ No	
Section 2: Detailed Source Information	☑ Yes ☐ No	
Table 3-A: New/Modified/Reconstructed Emission Unit Identification	☑ Yes ☐ No	
Table 3-B: New/Modified/Reconstructed Stack / Release Point Information	☑ Yes ☐ No	
Table 4-A: Insignificant Activities List	☑ Yes ☐ No	
Table 4-B: Insignificant Lubricating and Heavy Oil Storage Information	☑ Yes ☐ No	
Table 4-C: Insignificant Cooling Towers	☐ Yes ☑ No	No cooling towers
Table 5-A: New/Modified/Reconstructed Emission Units MPTE – Regulated Air Pollutant Emissions	☑ Yes ☐ No	
Table 5-B: New/Modified/Reconstructed Emission Units MPTE – VOC Emissions from VOC-Containing Materials	☐ Yes ☑ No	No Voc-containing materials
Table 5-C: New/Modified/Reconstructed Emission Units - HAP Emissions from HAP-Containing Materials	☐ Yes ☑ No	No Hap-containing materials
Table 5-D: New/Modified/Reconstructed Emission Units MPTE – PSD-Specific Pollutant Emissions	☐ Yes ☑ No	Non-PSD source
Table 5-E: Maximum Potential to Emit and Construction Permit Thresholds	☑ Yes ☐ No	
Section 6: Construction Permit Determination	☑ Yes ☐ No	
Table 6-A: Source-Elected Throughput Limits and Emission Control Requirements	☑ Yes ☐ No	
Table 6-B: Source-Elected Emission Limits	☐ Yes ☑ No	None
Table 6-C: Source-Elected Emission Limits for PSD Pollutants	☐ Yes ☑ No	None
Table 7-A: Facility-Wide APTE – Regulated Air Pollutant Emissions	☐ Yes ☑ No	No facility-wide elected limits
Table 7-B: Facility-Wide APTE – VOC Emissions from VOC-Containing Materials	☐ Yes ☑ No	No facility-wide elected limits

APPLICATION COMPLETENESS CHECKLIST

Table 7-C: Facility-Wide APTE – HAP Emissions from HAP-Containing Materials	☐ **Yes** ☑ **No**	No facility-wide elected limits
Table 7-D: New/Modified/Reconstructed Emission Units APTE – PSD-Specific Pollutant Emissions	☐ **Yes** ☑ **No**	None
Table 7-E: Actual Potential to Emit and Construction Permit Thresholds	☐ **Yes** ☑ **No**	None

Appendix B

Detailed Potential to Emit Calculations

EP-006 - Pyrolysis Unit (Biomass Energy Techniques, Inc. Pyrolysis Rotary Drum Biomass Carbonization Unit)

Methodology Source Reference: **AP-42, Fifth Edition, Volume I, Chapters 1.5 and 1.6**
Manufacturer Testing Report, Dated June 24, 2022

Assumptions:

The pyrolysis unit will be equipped with a thermal oxidizer afterburner with a 98% control efficiency.

The unit is assumed to be operating continuously for a year for the purposes of calculating the maximum potential to emit. The unit takes 2 days to complete one batch. Propane is used to start the pyrolysis unit for each batch, resulting in 183 startups per year.

Where particulate emissions are not spectated for PM10 and PM2.5, it is assumed the emission factor applies to both species. Calculations where the test report data was used includes emissions from the afterburner.

Calculations:

Maximum wood throughput	0.355	tons/hr, manufacturer rating
	3109.8	tons/yr, manufacturer rating
Maximum propane usage	5	gallons/startup, manufacturer rating
	915	gallons/yr, based on 183 startups per year

Wood Pyrolysis Emissions

	Pollutant	CAS	Emission Factor [1] lb/ton dry feed	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
Criteria Pollutants	NOx	-	2.01E+00	6.25E+03	3.12E+00	6.25E+03	3.12E+00
	SOx	-	4.33E-01	1.35E+03	6.73E-01	1.35E+03	6.73E-01
	CO	630-08-0	5.20E-02	1.62E+02	8.09E-02	1.62E+02	8.09E-02
	VOC	-	9.50E-01	2.95E+03	1.48E+00	5.91E+01	2.95E-02
	Pollutant	CAS	Emission Factor [1] lb/ton dry feed	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
	PM	-	1.75E+00	5.44E+03	2.72E+00	5.44E+03	2.72E+00
	PM_{10}	-	1.75E+00	5.44E+03	2.72E+00	5.44E+03	2.72E+00
	$PM_{2.5}$	-	1.75E+00	5.44E+03	2.72E+00	5.44E+03	2.72E+00
GHG	Pollutant	CAS	Emission Factor [2][3] lb/MMBtu	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
	CO_2	124-38-9	2.36E+03	1.28E+08	6.41E+04	1.28E+08	6.41E+04
	CH_4	74-82-8	1.59E-02	8.63E+02	4.31E-01	1.73E+01	8.63E-03
	N_2O	10024-97-2	7.94E-03	4.31E+02	2.16E-01	4.31E+02	2.16E-01
	CO_2e [4]	-	-	1.28E+08	6.42E+04	1.28E+08	6.42E+04

[1] Emission factor from *Source Emissions Test Report* created by AirSource Technologies, Inc. for BioMass Energy Techniques, Inc., dated June 24, 2022.

[2] Emission factor from 40 CFR 98 Tables C-1 and C-2.

[3] Higher heating value (HHV) of wood used for calculations is 17.48 MMBtu/ton from 40 CFR 98 Table C-1.

[4] CO_2e calculated using global warming potentials from Table A-1 to Subpart A of 40 CFR 98. CO_2 = 1; CH_4 = 25; N_2O = 298.

Propane Combustion Emissions

	Pollutant	CAS	Emission Factor [1] lb/10^3 gal	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
Criteria Pollutants	NOx	-	1.30E+01	1.19E+04	5.95E+00	1.19E+04	5.95E+00
	SOx [2]	-	1.50E-02	1.37E+01	6.86E-03	1.37E+01	6.86E-03
	CO	630-08-0	7.50E+00	6.86E+03	3.43E+00	6.86E+03	3.43E+00
	VOC	-	1.00E+00	9.15E+02	4.58E-01	1.83E+01	9.15E-03
	Pollutant	CAS	Emission Factor lb/10^3 gal	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
	PM	-	7.00E-01	6.41E+02	3.20E-01	6.41E+02	3.20E-01
	PM_{10}	-	7.00E-01	6.41E+02	3.20E-01	6.41E+02	3.20E-01
	$PM_{2.5}$	-	7.00E-01	6.41E+02	3.20E-01	6.41E+02	3.20E-01
GHG	CO_2	124-38-9	1.25E+04	1.14E+07	5.72E+03	1.14E+07	5.72E+03
	CH_4	74-82-8	2.00E-01	1.83E+02	9.15E-02	3.66E+00	1.83E-03
	N_2O	10024-97-2	9.00E-01	8.24E+02	4.12E-01	8.24E+02	4.12E-01
	CO_2e [3]	-	-	1.17E+07	5.84E+03	1.17E+07	5.84E+03

[1] Emission factor from AP-42, Chapter 1.5 Table 1.5-1.

[2] SO_2 emission factor used is for SO_x and calculated as 0.10 x S, where S is the sulfur content in gr/100 ft3, per AP-42 Chapter 1.5.

[3] CO_2e calculated using global warming potentials from Table A-1 to Subpart A of 40 CFR 98. CO_2 = 1; CH_4 = 25; N_2O = 298.

CLIENT	City of Lincoln - N 48th St SWMF				
PROJECT	Pyrolysis Unit Construction Permit				
SUBJECT	Propane Heater GHG Emissions				
		PROJECT NO.	27224038.04		
		PREPARED BY	B. Graham	DATE	3/14/2024
		REVIEWED BY	D. Tangeman	DATE	3/15/2024
		APPROVED BY	D. Tangeman	DATE	3/15/2024

EP-006 - Pyrolysis Unit (Biomass Energy Techniques, Inc. Pyrolysis Rotary Drum Biomass Carbonization Unit)

Methodology Source Reference: **AP-42, Fifth Edition, Volume I, Chapters 1.5 and 1.6**
Manufacturer Testing Report, Dated June 24, 2022

Wood Pyrolysis Emissions

	Pollutant	CAS	Emission Factor [1][2] lb/MMBtu	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
HAPs[3]	Acetaldehyde	75-07-0	8.30E-04	4.51E+01	2.26E-02	9.02E-01	4.51E-04
	Acetophenone	98-86-2	3.20E-09	1.74E-04	8.70E-08	3.48E-06	1.74E-09
	Acrolein	107-02-8	4.00E-03	2.17E+02	1.09E-01	4.35E+00	2.17E-03
	Benzene	71-43-2	4.20E-03	2.28E+02	1.14E-01	4.57E+00	2.28E-03
	Bis(2-ethylexyl)phthalate	117-81-7	4.70E-08	2.55E-03	1.28E-06	5.11E-05	2.55E-08
	Carbon tetrachloride	56-23-5	4.50E-05	2.45E+00	1.22E-03	4.89E-02	2.45E-05
	Chlorine	7782-50-5	7.90E-04	4.29E+01	2.15E-02	8.59E-01	4.29E-04
	Chlorobenzene	108-90-7	3.30E-05	1.79E+00	8.97E-04	3.59E-02	1.79E-05
	Chloroform	67-66-3	2.80E-05	1.52E+00	7.61E-04	3.04E-02	1.52E-05
	Chloromethane	74-87-3	2.30E-05	1.25E+00	6.25E-04	2.50E-02	1.25E-05
	Dichloromethane	75-09-2	2.90E-04	1.58E+01	7.88E-03	3.15E-01	1.58E-04
	1,2-Dichloropropane	78-87-5	5.00E-05	2.72E+00	1.36E-03	5.44E-02	2.72E-05
	2,4-Dinitrophenol	51-28-5	1.80E-07	9.78E-03	4.89E-06	1.96E-04	9.78E-08
	Formaldehyde	50-00-0	4.40E-03	2.39E+02	1.20E-01	4.78E+00	2.39E-03
	Naphthalene	91-20-3	9.70E-05	5.27E+00	2.64E-03	1.05E-01	5.27E-05
	4-Nitrophenol	100-02-7	1.10E-07	5.98E-03	2.99E-06	1.20E-04	5.98E-08
	Pentachlorophenol	87-86-5	5.10E-08	2.77E-03	1.39E-06	5.54E-05	2.77E-08
	Phenol	108-95-2	5.10E-05	2.77E+00	1.39E-03	5.54E-02	2.77E-05
	Propionaldehyde	123-38-6	3.20E-05	1.74E+00	8.70E-04	3.48E-02	1.74E-05
	Styrene	100-42-5	1.90E-03	1.03E+02	5.16E-02	2.07E+00	1.03E-03
	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	8.60E-12	4.67E-07	2.34E-10	9.35E-09	4.67E-12
	Toluene	108-88-3	9.20E-04	5.00E+01	2.50E-02	1.00E+00	5.00E-04
	2,4,6-Trichlorophenol	88-06-2	2.20E-08	1.20E-03	5.98E-07	2.39E-05	1.20E-08
	Vinyl Chloride	75-01-4	1.80E-05	9.78E-01	4.89E-04	1.96E-02	9.78E-06
	o-Xylene	95-47-6	2.50E-05	1.36E+00	6.79E-04	2.72E-02	1.36E-05

	Pollutant	CAS	Emission Factor lb/MMBtu	Maximum Potential Emissions lb/yr	Maximum Potential Emissions tons/yr	Max Controlled Emissions lb/yr	Max Controlled Emissions tons/yr
HAP Metals	Antimony	-	7.90E-06	4.29E-01	2.15E-04	4.29E-01	2.15E-04
	Arsenic	-	2.20E-05	1.20E+00	5.98E-04	1.20E+00	5.98E-04
	Beryllium	-	1.10E-06	5.98E-02	2.99E-05	5.98E-02	2.99E-05
	Cadmium	-	4.10E-06	2.23E-01	1.11E-04	2.23E-01	1.11E-04
	Chromium	-	2.10E-05	1.14E+00	5.71E-04	1.14E+00	5.71E-04
	Cobalt	-	6.50E-06	3.53E-01	1.77E-04	3.53E-01	1.77E-04
	Lead	-	4.80E-05	2.61E+00	1.30E-03	2.61E+00	1.30E-03
	Manganese	-	1.60E-03	8.70E+01	4.35E-02	8.70E+01	4.35E-02
	Mercury	-	3.50E-06	1.90E-01	9.51E-05	1.90E-01	9.51E-05
	Nickel	-	3.30E-05	1.79E+00	8.97E-04	1.79E+00	8.97E-04
	Selenium	-	2.80E-06	1.52E-01	7.61E-05	1.52E-01	7.61E-05

[1] Emission factors from AP-42 Chapter 1.6 Tables 1.6-3 and 1.6-4.

[2] Higher heating value (HHV) of wood used for calculations is 17.48 MMBtu/ton from 40 CFR 98 Table C-1.

[3] Includes hazardous air pollutants (HAPs) that are also volatile organic compounds (VOCs).