CITY OF ALBUQUERQUE
ENVIRONMENTAL HEALTH DEPARTMENT
AIR QUALITY PROGRAM

Permit Modification Application
#1958-M1-1AR

Kairos Power, LLC
Kairos Power Southwest facility

Prepared By:

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December 2024

Project 233201.0125

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December 13, 2024

Jonathan Florez
Senior Environmental Heath Scientist
Air Quality Program
Environmental Health Department
City of Albuquerque
jflorez@cabq.gov
(505) 768-1948

RE: Air Quality construction Permit Application #1958-M2 Administrative Incompleteness Determination

Dear Mr. Florez:

On behalf of Kairos Power, LLC (Kairos), Trinity Consultants (Trinity) submitted an air quality construction permit application to the City of Albuquerque, Environmental Health Department, Air Quality Program (Program) on October 9, 2024, for the Kairos Power Southwest facility located at 5201 Hawking Drive SW in Albuquerque, NM. The Program conducted an initial review of the application, and based on the information provided, was unable to complete a thorough evaluation. As a result, the application was deemed administratively incomplete on November 7, 2024.

Enclosed is the revised and completed air quality construction permit application for the Kairos Power Southwest facility. This updated submission includes all required information as outlined in 20.11.41.13 NMAC. Below, we have provided the comments received from the Program along with detailed responses that demonstrate how the necessary updates were made to ensure compliance with the applicable standards.

1. *The five existing emergency generators should not have TBD listed on the Regulated Emission Sources Table for their serial #, manufacture date, installation date and modification date. These should all be things Kairos already knows and they are in the current permit. Please provide this information.*
    a. **The serial numbers, manufacture date, installation date, and modification dates have been added to the Regulated Sources Table for the five existing emergency generators.**

2. *The uncontrolled and controlled emissions for the Pebble Development Laboratory (PDL) are not accounted for properly in the modeling or application. The emission rates should account for both batch and in-between batch operations. If the 'uncontrolled' emissions occur from the carbonizing furnace between each batch, then those are probably more likely/frequent than the batch emissions they are counting as controlled emissions. Unless the batch process takes multiple hours, the controlled emissions should be the combined emissions from batch and in-between batch processes that may occur in an hour.*
    a. **The uncontrolled and controlled emission rates from the PDL now represent both batch and intermittent operations. The PDL is uncontrolled. The PDL and CARB-1 share the same vent stack on the building. Therefore, the criteria pollutants from the PDL will be added to the CARB-1 source in the air dispersion modeling.**

3. *The source description seems to indicate that the intermediate gas/vapor emissions from different parts of the PDL are released via the Exhaust units. Are these the batch emissions or in-between batch emissions? They may pass through the thermal oxidizer of the carbonizing furnace first to be oxidized to CO2, NOx, CO, methane, etc. but this is unclear. If so, where are the emissions released? Are those NOx, CO and other emissions accounted for in the CARB1 emissions? Or are the 'uncontrolled' PDL emissions really the abnormal/emergency conditions?*
    a. **The intermittent emissions from the PDL are a result of the emissions from the CARB-1 unit when it shutdown. During this time, those emissions are routed to the vent stack for the PDL. Per Comment #2, the intermittent and batch operations were combined for both uncontrolled and controlled emission rates. Additionally, the PDL and CARB-1 do share the same vent. Therefore emission from the PDL will be represented with emissions from CARB-1 in the air dispersion modeling analysis.**

4. *It appears that building HVAC emissions (Unit Exhaust) are not calculated correctly for uncontrolled emissions. The uncontrolled emissions are calculated with the dust collector in place and then the controlled emissions adds the HEPA filter control efficiency. The uncontrolled emissions should be the Exhaust emissions, if there were no dust collector in place. Or is Kairos Power saying the dust collectors are integral and the units cannot run without them?*

    a. *The same question applies to the dust collectors, DC1 & DC2, and the ETU.*
        i. **The duct collectors are an integral part of the process, and the units cannot run without them. This is true for Unit Exhaust, DC1, DC2, and the ETU.**

    b. *Why was an inlet grain loading value of 1 gr/dscf used for Exhaust but 2 gr/dcsf used for DC1 & DC2 and 0.05 gr/dscf used for ETU? What are these assumed grain loading values based on? The calculated uncontrolled emissions for all three of these units use 0.05 gr/dscf, which is different from the application report.*
        i. **The 0.05 gr/dscf used in the calculations are correct. The values in the calculation methodology of the application were updated. The 0.05 gr/dscf were assumed values based on engineering estimates for the facility operations.**

5. *Why does the application Purchased HAPs Table say 'No Purchased HAPs at this Facility', yet there are calculations for hydrogen fluoride (HF) emissions? Is the HF not purchased?*
    a. **Hydrogen fluoride (HF) is not purchased. The HF emissions occur when FLIBE salt coolant is heated during reactor testing. An SDS sheet for FLIBE has been included with the Supporting Documentation.**

6. *It appears that Kairos did not pay the correct fees. Kairos states that they are applicable to IIII and ZZZZ but they paid no fees for these federal subparts. If the applicable emergency engines and fire pumps are new or being modified as part of this permitting action then the fees are owed. It appears that at least one of the fire pump engines may be subject to JJJJ according to the calculation spreadsheet but that may not be accurate.*
    a. **The Permit Application Review Fee Checklist page has been updated to incorporate the additional fees associated with the Federal Program Review Fees for 40 CFR 60 (for NSPS IIII), and for 40 CFR 63 (for MACT ZZZZ). The fire pumps are subject to NSPS IIII as they are diesel fired. An additional check of $2,770 has been provided with this updated application.**

a. *Please confirm the fuel for the engines that power the emergency fire pumps. The application report, application form and calculations say the fire pumps are diesel fired, whereas the EPA Certificate of Conformity inside the calculations file says the engine is propane or natural gas fired.*
    i. **Both the emergency engines and fire pumps are diesel fired. The EPA Certificate of Conformity does not apply to these units and were therefore removed from the calculation spreadsheet.**

7. *If the emergency engines and fire pumps are subject to NSPS or NESHAP regulations, the emissions should be calculated using the applicable NSPS or NESHAP emission factors for pollutants that have them, not AP-42. This will ensure that the resulting emission rates are not higher or lower than allowed by the NSPS or NESHAP regulation(s) thereby reducing the potential for excess emissions and/or noncompliance.*
    a. **The generators already use NSPS Tier 2 emission factors appropriate for their rated capacity. The diesel pumps were updated to also use NSPS Tier 4 emission factors to ensure emission rates are not higher than that allowed by NSPS or NESHAP regulations.**

8. *The reply/zonal certification letter from the CABQ Planning Department is missing. This is a required part of the application package. There is an application for zonal certification but no response/certification letter.*
    a. **The zonal certification letter from the CABQ Planning Department was sent to Kairos on October 28, 2024. This letter has been added to Appendix E of the application.**

A preliminary review of the modeling submitted for the Kairos Power Southwest facility identified certain deficiencies. These issues have since been addressed, and the necessary revisions have been incorporated into the updated models included with this application.

9. *The Program has some concerns about the modeled source and building locations. The Google Earth imagery in Figure 3 of the modeling report showing the source locations on the main Kairos building is dated 4/18/2023. The source locations when projected from BEEST or Breeze to Google Earth do not match these locations with the same imagery, they are offset. This is most noticeable with ETU1-3, which are noticeably south of where the actual stacks are located. Trinity Consultants appears to have used 10/10/2022 imagery in the models to plot source locations but may not have georeferenced the imagery accurately in Breeze because the locations aren't accurate for that imagery date either when projected to Google Earth even though the locations appear accurate in the models. Please confirm and use consistent source locations.*
    a. **The models have been updated to use the latest aerial imagery available on Google Earth dated 8/19/2024. The source locations have been updated based on this latest imagery and the figures in the modeling report now reflect this image as well. Additionally, the KPSW building was broken up into multiple smaller buildings to account for the various heights of the building itself.**

10. *The stack locations do not match between the modeling files and the application Stack Parameters Table. The locations are 10+ meters different in most cases.*

Unit	*Modeled Location*	*Stack Parameters Table Location*

	Easting	*Northing*	*Easting*	*Northing*
DC1	*353013*	*3874766.6*	*353025*	*3874779*
CARB1	*353014.2*	*3874715.9*	*353026*	*3874723*
ETU1	*352940.2*	*3874708.7*	*352951*	*3874715*
ETU2	*352940.3*	*3874712.5*	*352951*	*3874719*
ETU3	*352940.2*	*3874704.3*	*352951*	*3874723*
EX1	*352983.7*	*3874706.6*	*352998*	*3874719*
EX2	*352990*	*3874709.3*	*353000*	*3874719*
EX3	*352970.3*	*3874715.7*	*352982*	*3874728*
EX4	*353015.2*	*3874830.5*	*353027*	*3874843*
EX5	*353016.9*	*3874835*	*353029*	*3874847*
EX6	*353009.8*	*3874860.7*	*353035*	*3874871*
EX7	*353021*	*3874859.9*	*353035*	*3874873*

   a. **The stack locations in the Stack Parameters Table of the application were not updated with the latest locations used in the air dispersion modeling. That being said, based on Comment 9 the modeled sources and buildings were updated to reflect the latest Google Earth Imagery available to date (8/19/2024). Additionally, the stack heights were updated based on the updated KPSW building heights.**

11. *The building outlines do not appear to be accurate. As with the source locations, there are differences between the modeled locations and the listed building corners in Tables 7 & 8 of the modeling report. What are the correct building corners? a. Is BLDG1 in Table 8 supposed to be BLDG2? There is already a rectangular BLDG1 in Table 7 on the previous page. Where is BLDG4, the main Kairos building? It is not in the modeling report at all.*
    a. **The building corners in Tables 7 & 8 of the modeling report were not updated with the latest air dispersion modeling. Per Comment 9, the buildings were redrawn to fit the 8/19/2024 Google Earth Imagery and Tables 7 & 8 of the modeling report have been updated. To make sure building outlines match the google earth image, all buildings were modeled as polygons. Additionally, the KPSW building (BLDG-1) was broken up into multiple buildings (BLDG-1_1 through BLDG-1_5) to account for the various heights of the building itself.**

12. *The facility location is inconsistent between the modeling report, the application report and the application form. The UTM Northing value from the modeling report (352,990 m E and 3,874,802 m N) doesn't match the Northing value listed in the Executive Summary of the application report (3,874,795 m N) but the Easting values match. Neither of these locations match the UTM coordinates listed on page 2 of the application form itself (353,322 m E, 3,874,379 m N). The coordinates from the Executive Summary match the NOI and yellow sign public notice and appear accurate for the middle of the main Kairos building. The facility coordinates should be consistent between documents, not 10s to 100s of meters different.*
    a. **The facility coordinates in both the executive summary, the application form, and the modeling report have been updated to match the NOI and yellow sign public notice (352,990 m E and 3,874,795 m N).**

13. *There are problems with the Albuquerque Asphalt (AAI) surrounding source parameters. The volume source parameters are all incorrect. Trinity Consultants input them as feet but the parameters for volume and area sources were provided in meters. Please correct these errors.*
    a. **The volume source parameters were updated to the correct values in meters.**

14. *The factor sets for AAI sources are all incorrect. The start times seem to be correct but the end times are too late for most months for the engines and the other sources. The months that don't have late end times appear to have correct end times. This is extra operating time so technically it is conservative but it should be corrected to be accurate.*
    a. **There was an error with the excel calculations to generate the factor sets for the AAI source for the previous models. This has now been fixed.**

15. *Why are the Carbonizing Furnace (CARB1) emissions calculated using AP-42 Chapter 1.4 natural gas emission factors when the application report, Regulated Emission Sources Table and calculations all indicate CARB1 uses propane as its fuel? The calculations file includes a clip of the first section of AP-42 Chapter 1.5 for LPG (propane) so why were these emission factors not used? A quick check indicates the emissions may be higher using the correct propane emission factors. There do not appear to be propane HAP emission factors so those could still be calculated based on natural gas combustion. If the emission rates change then the modeling will need to be updated.*

    a. *If there is a thermal oxidizer in the carbonizing furnace, does that require a separate fuel flow or is that the part of the carbonizing furnace that requires fuel and that is accounted for in the CARB1 fuel flow and emissions?*
    b. **The thermal oxidizer in the carbonizing furnace uses propane as fuel while the carbonizing furnace itself is electric and does not use fuel. The emission factors uses for CARB-1 were updated to use AP-42 Chapter 1.5 emission factors to account for the use of propane as fuel. This increases lb/hr emission rates for NO_x, CO, SO_2, and PM. HAP emissions still use AP-42 Chapter 1.4.**

16. *The Pebble Development Laboratory (PDL) is incorrectly referred to as the TRISO Development Laboratory (TDL) in the summary of the modeling report. The applicant's public notice documents also mistakenly refer to a TDL. This is a very minor issue and would not have resulted in an incomplete determination but needs to be addressed in the resubmittal of the application. The public notice likely does not need to be re-done.*
    a. **The references to the TDL in both the model summary report and the public notice documents were updated to the PDL. Since emission rates changed with this updated application, the public notice was redone and the updated yellow sign and email confirmation have been added to this application.**

The following are responses to the relatively minor items found that were addressed in the resubmittal of the application:

17. *The Application for Air Pollutant Sources in Bernalillo County, Page 2 of 14 (bottom of the page) is marked 'N/A' for List raw materials processed, and 'N/A' for List saleable item(s) produced. Please list the raw materials that will be entering the facility and the items produced.*
    a. **A list of raw materials was included with the Application for Air Pollutant Sources in Bernalillo County. There are no saleable items at the KPSW facility.**

18. *Application - Item 2. Description of the Facility and Emissions Information mentions that the facility 'has the streamlined ability to manufacture, assemble and test key systems, demonstrate the integration of principal KP-FHR technologies'. This statement is nonspecific. Please articulate what will be manufactured, assembled and tested at Kairos Power Southwest.*
    a. **The Description of the Facility and Emissions Information was updated to be more specific about what is manufactured, assembled, and tested at KPSW.**

19. *The Program sent emails to Kairos Power and Trinity Consultants on October 15 and 17, 2024, regarding the startup shut down and maintenance description in the application. The AQP has yet to receive an adequate response. The requested information was pursuant to 20.11.41.13.E (5) NMAC.*
    a. **Additional information has been provided to the startup shut down, and maintenance description in the application.**

Sincerely,

Adam Erenstein
Principal Consultant

Trinity Project File 233201.0125

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1. EXECUTIVE SUMMARY

This application is being submitted for the proposed modification to ATC Permit #1958-M1-1AR for the Kairos Power Southwest (KPSW) facility owned and operated by Kairos Power, LLC (Kairos).

The KPSW facility (previously known as the Nova Corporation Albuquerque IT/Data Center) was previously owned and operated by Nova Corporation. A transfer of ownership from Nova Corporation to Kairos was issued on February 2, 2023.

This modification includes the addition of sources associated with graphite machining and fuel development. Specifically, the proposed modifications include the following updates to the existing permit:
The addition of:

- Two (2) 18,000 acfm Donaldson DFE 4-32 dust collectors (units DUST-1 & DUST-2);
- One (1) carbonizing furnace (unit CARB-1);
- One (1) Pebble Development Laboratory (unit PDL);
- Three (3) engineering testing units (all under unit ETU);
- Seven (7) building exhaust vents (unit Exhaust); and
- One (1) 3 hp diesel fired pump (unit Pump-2)

The replacement of:

- One (1) 183 hp John Deere diesel fired fire pump (unit 12) with one (1) 422 hp diesel fired pump (unit Pump-1)

The modification of:

- One (1) 900 hp Caterpillar emergency diesel fired generator (unit GEN-1) (previously Unit 1); and
- Four (4) 1490 hp Cummins emergency diesel fired generators (units GEN-2 through GEN-5) (previously units 2 through 5)

Finally, the location of the KPSW facility will be updated to UTM Zone 13 352,990 m E and 3,874,795 m N as the permitted location was incorrect.

In accordance with 20.11.41.13.E NMAC, this application submittal includes all of the requirements set forth by the department including:

i. Application Forms
ii. Owner and Operator's Name and Mailing Address
iii. Application Date
iv. Sufficient Attachments: Calculations, Potential Emission Rate, Nature of All Regulated Contaminants, Actual emissions
v. Operational and Maintenance Strategy
vi. Topographical Map
vii. Aerial Photograph of proposed location
viii. Complete Description of all Sources of Regulated Air Contaminants and Process Flow Diagram
ix. Full Description of Air Pollution Control Equipment
x. Description of Equipment or Methods used for emission measurement
xi. Maximum and Normal Operating Time Schedules of the Source
xii. Other Relevant Information
xiii. Applicant Signature
xiv. Accompanied by a Registration Fee
xv. Proof of Public Notice Requirements

2. DESCRIPTION OF FACILITY AND EMISSIONS INFORMATION

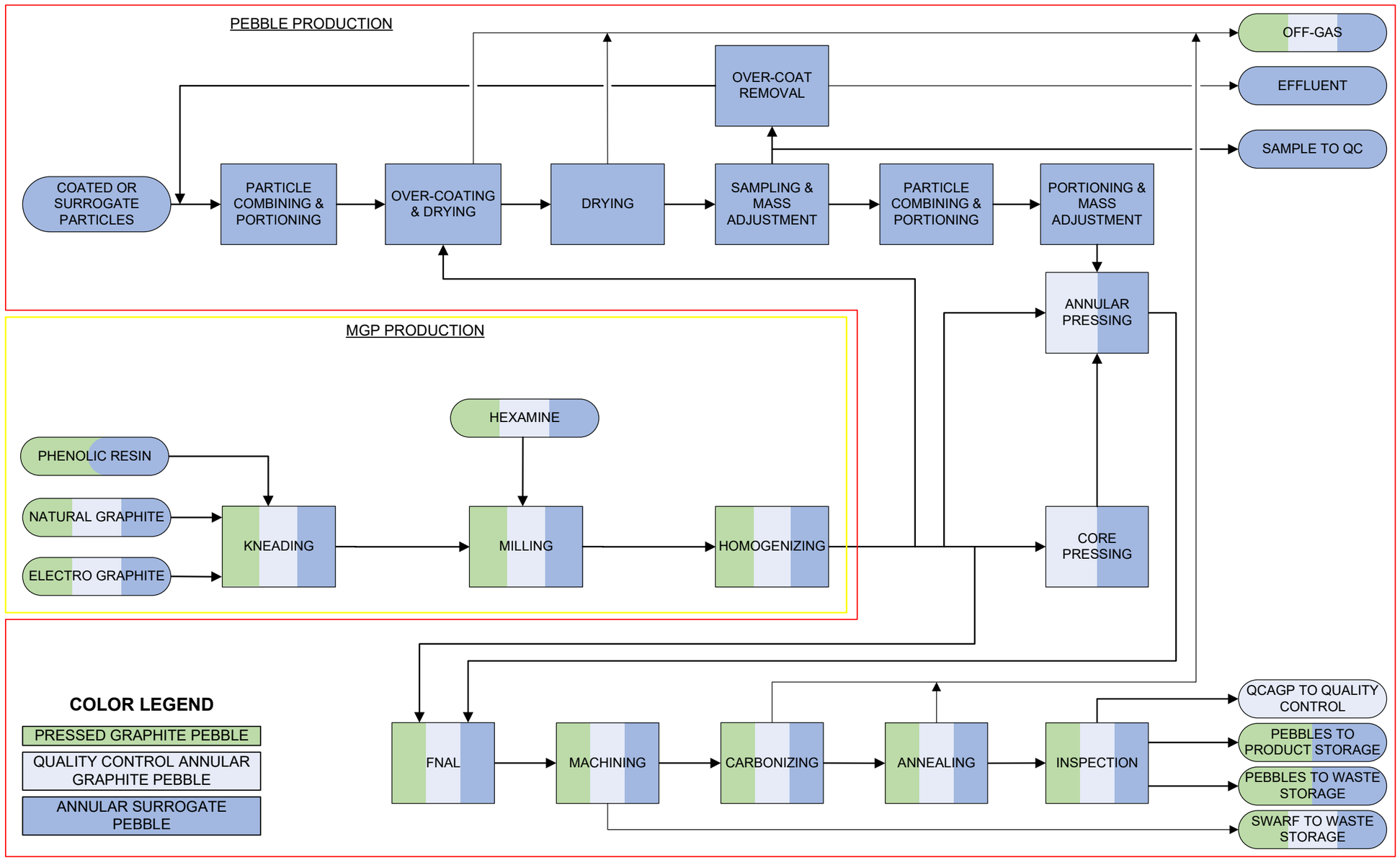
The following section summarized the emission factors and methodology used to estimate air pollutant emissions from the KPSW facility.

2.1 Description of the Facility

Kairos Power's facility in Albuquerque is the manufacturing, assembly, and test center location. This facility consists of a machine shop, assembly center, two technical labs (PDL and M&C), and a system testing center. The machine shop fabricates components of the reactor systems using stainless steel, aluminum, and graphite. The components are then assembled into modular process skids which allow for efficient construction of the reactor system. The Pebble Development Laboratory (PDL) supports fuel design for the reactors by developing the manufacturing technology needed to produce the fuel pebbles. The materials and characterization lab (MCL) supports the entire facility through characterizing metallographic and graphitic samples using various imaging techniques. In addition, the MCL can test materials for thermophysical properties and supports the environmental testing for Be levels via UV-Vis. The systems test center is used for preliminary data collection including assembly practice, maintenance, and reactor operations. Prototypes are assembled, tested, and analyzed to support in the final design. This facility enables Kairos with the streamlined ability to manufacture, assemble, and test key systems, demonstrate the integration of principal KP-FHR technologies, accelerate operational experience, and establish a mature supply chain to deliver Kairos Power's advanced reactor technology.

2.2 Process Flow Diagram

A process flow diagram (PFD) is attached below.


PEBBLE PRODUCTION
COATED OR SURROGATE PARTICLES
PARTICLE COMBINING & PORTIONING
OVER-COATING & DRYING
DRYING
OVER-COAT REMOVAL
SAMPLING & MASS ADJUSTMENT
PARTICLE COMBINING & PORTIONING
PORTIONING & MASS ADJUSTMENT
OFF-GAS
EFFLUENT
SAMPLE TO QC
ANNULAR PRESSING
MGP PRODUCTION
HEXAMINE
PHENOLIC RESIN
NATURAL GRAPHITE
ELECTRO GRAPHITE
KNEADING
MILLING
HOMOGENIZING
CORE PRESSING
COLOR LEGEND
PRESSED GRAPHITE PEBBLE
QUALITY CONTROL ANNULAR GRAPHITE PEBBLE
ANNULAR SURROGATE PEBBLE
FNAL
MACHINING
CARBONIZING
ANNEALING
INSPECTION
QCAGP TO QUALITY CONTROL
PEBBLES TO PRODUCT STORAGE
PEBBLES TO WASTE STORAGE
SWARF TO WASTE STORAGE

2.3 Air Pollutant Emissions and Calculation Methodology

HVAC Dust Collectors Emissions (Units DUST-1 and DUST-2)

Emissions for the new HVAC dust collector consist only of particulate matter (PM, PM_{10}, and $PM_{2.5}$). An assumption of 0.05 gr/dscf was used for the inlet grain loading value for uncontrolled emissions rates. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust. The manufacturer guaranteed exit grain loading rate of 0.002 gr/dscf was used for controlled emissions. DUST-2 has an additional HEPA filter which provides a 99.97% reduction control efficiency as by EPA guidance on HEPA filters. For both uncontrolled and controlled emission rates, the manufacturer designed exit flow rate of 18,000 acfm was used. It was assumed the exhaust flow would operate at standard temperature and pressure (STP) thus converting 18,000 acfm to 18,000 dscfm. Filtered PM_{10} to filtered PM and filtered $PM_{2.5}$ to PM ratios were obtained using AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2. Category 3.

For the uncontrolled PM emissions, the inlet grain loading (gr/dscf) is multiplied by the dust collector flow rate (dscfm), then divided by the conversion factor of 7,000 gr/lb, then multiplied by the conversion factor of 60 min/hr to calculate lb/hr emission values. For PM_{10} and $PM_{2.5}$ emissions, the hourly PM emissions (lb/hr) were multiplied by the appropriate ratio of Filtered PM_{10} : Filtered PM and Filtered $PM_{2.5}$: Filtered PM ratios. Hourly emissions (lb/hr) are multiplied by 8,760 hr/yr and divided by 2,000 lb/ton to convert to annual emissions (tpy).

For the controlled emissions, the outlet grain loading (gr/dscf) was used in lieu of the inlet grain loading (gr/dscf), and the same methodology was applied. For DUST-2 the hourly and annual emissions were multiplied by 1% for the control reduction efficiency of the HEPA filter. Complete calculations are included in Section 2.4.

Carbonizing Furnace Emissions (Unit CARB-1)

Emissions from the new carbonizing furnace are a result of the combustion emissions (associated with the combustion of liquefied petroleum gas (LPG), specifically propane. NO_x CO, VOC, SO_2, and PM emissions are based on AP-42 Table 1.5-1 for propane. Since AP-42 Section 1.5 does not contain HAP emission factors, Total HAP combustion emissions are based on AP-42 Table 1.4-3 for natural gas.

Emission factors for NO_x, CO, VOC, SO_2, PM, and HAPs are in units of lb/MMscf. The fuel consumption rate of the carbonizing furnace (MMscf/hr) is multiplied by the emission factors (lb/MMscf) to calculate lb/hr emission rates. Hourly emissions (lb/hr) are multiplied by 8,760 hr/yr and divided by 2,000 lb/ton to convert to annual emissions (tpy). Complete calculations are included in Section 2.4.

Pebble Development Laboratory Emissions (Unit PDL)

The Pebble Development Laboratory emissions are a result of batch and intermittent operations. Both uncontrolled and controlled emissions contain intermittent electric carbonizing furnace emissions in between batches as well as emissions emitted during each batch process from various lab testing and overcoater activities.

An analysis of all the intermittent gas/vapor emissions steams sent from different processing areas of the PDL were compiled along with their overall composition and vapor mass flow rate. This stream contains carbon monoxide (CO), methane, phenol, p-benzylphenol, and 4’4-isopropylidenedipheno.

The degassing in the electric carbonizing furnace produces the following intermittent emissions that move internally to the thermal oxidizer of the carbonizing furnace before releasing to atmosphere by the process ventilation system once oxidized to CO_2 and NO_x, CO, Methane (CH_4), Phenol, P-benzylphenol, and 4'4-isopropylidenediphenol. In an event where the furnace shuts down, the entire furnace interlocks out and the thermal oxidizer on CARB-1 shuts down. There is a potential for a slight release of off gas constituents in the furnace until it cools down. The estimated time of release is 10 minutes. The release of the above constituents will be trace compared to the total 2.1 kg. The 10 minutes of off-gassing is anticipated to be released.

At minimal conditions, the lowest process ventilation flow setting required to maintain a methanol atmosphere in the overcoater below 25% of the LEL is 2 cfm. The process ventilation connected to the overcoater for process ventilation has a capacity of 100 cfm. The process ventilation is dampened for the overcoating process and always maintained above the 25% below LEL requirement. Value provided for is total anticipated solvent removal per run, calculated per annum. The usage matches the requirement of the carbonizing furnace (CARB-1) of 80 batches per annum. The PDL and CARB-1 will share the same ventilation stack.

Engineering Testing Unit HVAC Emissions (Unit ETU)

Emissions from the new engineering testing unit HVAC consist only of particulate matter (PM, PM_{10}, and $PM_{2.5}$). An estimate of 0.05 gr/dscf was used for the inlet grain loading value for uncontrolled emissions rates based on Kairos's experience with ETUs. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust. A HEPA filter is used which provides a 99.97% reduction control efficiency as specified by EPA guidance on HEPA filters. For both uncontrolled and controlled emission rates, the manufacturer designed exit flow rate of 96,000 acfm was used. It was assumed the exhaust flow would operate at standard temperature and pressure (STP) thus converting 96,000 acfm to 96,000 dscfm. Filtered PM_{10} to filtered PM and filtered $PM_{2.5}$ to PM ratios were obtained using AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2. Category 3.

For the uncontrolled PM emissions, the inlet grain loading (gr/dscf) is multiplied by the dust collector flow rate (dscfm), then divided by the conversion factor of 7000 gr/lb, then multiplied by the conversion factor of 60 min/hr to calculate lb/hr emission values. For PM_{10} and $PM_{2.5}$ emissions, the hourly PM emissions (lb/hr) were multiplied by the appropriate ratio of Filtered PM_{10} : Filtered PM and Filtered $PM_{2.5}$: Filtered PM ratios. Hourly emissions (lb/hr) are multiplied by 8,760 hr/yr and divided by 2,000 lb/ton to convert to annual emissions (tpy).

For the controlled emissions, the hourly and annual emissions were multiplied by 0.1% for the control reduction efficiency of the HEPA filter. Complete calculations are included in Section 2.4.

Building HVAC Emissions (Unit Exhaust)

Emissions from the building's HVAC exhaust vents consist only of particulate matter (PM, PM_{10}, and $PM_{2.5}$). An assumption of 0.05 gr/dscf was used for the inlet grain loading value for uncontrolled emissions rates. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust. A HEPA filter is used which provides a 99.97% reduction control efficiency as specified by EPA guidance on HEPA filters. For both uncontrolled and controlled emission rates, the manufacturer designed exit flow rate of 32,096 acfm was used. It was assumed the exhaust flow would operate at

standard temperature and pressure (STP) thus converting 32,096 acfm to 32,096 dscfm. Filtered PM_{10} to filtered PM and filtered $PM_{2.5}$ to PM ratios were obtained using AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2. Category 3.

For the uncontrolled PM emissions, the inlet grain loading (gr/dscf) is multiplied by the dust collector flow rate (dscfm), then divided by the conversion factor of 7,000 gr/lb, then multiplied by the conversion factor of 60 min/hr to calculate lb/hr emission values. For PM_{10} and $PM_{2.5}$ emissions, the hourly PM emissions (lb/hr) were multiplied by the appropriate ratio of Filtered PM_{10} : Filtered PM and Filtered $PM_{2.5}$: Filtered PM ratios. Hourly emissions (lb/hr) are multiplied by 8,760 hr/yr and divided by 2,000 lb/ton to convert to annual emissions (tpy).

For the controlled emissions, the hourly and annual emissions were multiplied by 0.1% for the control reduction efficiency of the HEPA filter. Complete calculations are included in Section 2.4.

Emergency Diesel Fired Generators (Units GEN-1 through GEN-5)

Emissions from the existing generators are a result of the combustion of diesel fuel. The diesel heat value was taken from AP-42 Appendix A. An assumed fuel consumption value of 43 gal/hr for GEN-1 and 56.4 gal/hr for GEN-2 through GEN-5 were used based on similar models. NO_x, CO, VOC, and PM emissions are based on EPA NSPS Tier 2 emission factors for NO_x, CO, NMHC, and PM emissions factors for 560 ≤ kW < 900 rated power engines (GEN-1) and > 900kW rated power engines (GEN-2 through GEN-5). NO_x and NMHC are derived from NO_x+NMHC based on the assumption of 95% NO_x and 5% NMHC according to Table D-25 on California Environmental Protection Agency (CARB, Revised Date: December 18, 2011). SO_2 emissions are based AP-42 Table 3.3-1 emission factors for SO_2. HAP emissions are based on AP-42 Table 3.3-1 & 3.3-2 emission factors. HAPs include formaldehyde, acetaldehyde, acrolein, benzene, toluene, xylene, propylene, 1-3-Butadiene, and naphthalene.

For NO_x, CO, VOC, and PM emissions, the emission factors (g/kW-hr) were divided by 453.59 g/lb and multiplied by the engine power (kW) to calculate lb/hr emissions. The heat value (Btu/gal) was multiplied by the fuel consumption (gal/hr) and divided by 10^6 Btu/MMBtu to obtain a maximum heat rate (MMBtu/hr). For SO_2 and HAP emissions, the emission factors (lb/MMBtu) were multiplied by the heat rate (MMBtu/hr) to calculate lb/hr emissions. For uncontrolled annual emissions, the lb/hr rate was multiplied by 8,760 hr/yr and divided by 2,000 lb/ton. For controlled annual emissions, the lb/hr rate was multiplied by 500 hr/yr and divided by 2,000 lb/ton.

Diesel Fired Pumps (Pump-1 and Pump-2)

Emissions from the pumps are a result of the combustion of diesel fuel. The diesel heat value was taken from AP-42 Appendix A. An assumed fuel consumption value of 2.0 gal/hr for Pump-1 and 0.25 gal/hr for Pump-2 were used based on similar models. NO_x, CO, VOC, and PM emissions are based on EPA NSPS Tier 4 emission factors for NO_x, CO, NMHC, and PM emissions factors for 225 ≤ kW < 450 rated power engines (Pump-1) and kW < 8 rated power engines (Pump-2). For Pump-2, NO_x and NMHC are derived from NO_x+NMHC based on the assumption of 95% NO_x and 5% NMHC according to Table D-25 on California Environmental Protection Agency (CARB, Revised Date: December 18, 2011). SO_2 emissions are based AP-42 Table 3.3-1 emission factors for SO_2. HAP emissions are based on AP-42 Table 3.3-1 & 3.3-2 emission factors. HAPs include formaldehyde, acetaldehyde, acrolein, benzene, toluene, xylene, propylene, 1-3-Butadiene, and naphthalene.

For NO_x, CO, VOC, and PM emissions, the emission factors (g/kW-hr) were divided by 453.59 g/lb and multiplied by the engine power (kW) to calculate lb/hr emissions. The heat value (Btu/gal) was multiplied by

the fuel consumption (gal/hr) and divided by 10^6 Btu/MMBtu to obtain a maximum heat rate (MMBtu/hr). For SO_2 and HAP emissions, the emission factors (lb/MMBtu) were multiplied by the heat rate (MMBtu/hr) to calculate lb/hr emissions. For uncontrolled annual emissions, the lb/hr rate was multiplied by 8,760 hr/yr and divided by 2,000 lb/ton. For controlled annual emissions, the lb/hr rate was multiplied by 500 hr/yr and divided by 2,000 lb/ton.

2.4 Emission Calculations

The following pages contain the emission calculations for all sources of emission at the KPSW facility.

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

Emission Summary

Uncontrolled Emissions

Unit	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		Total HAPs		Hydrogen Fluoride		Formaldehyde	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
DUST-1	-	-	-	-	-	-	-	-	3.93	17.23	1.16	5.07	-	-	-	-	-	-
DUST-2	-	-	-	-	-	-	-	-	3.93	17.23	1.16	5.07	-	-	-	-	-	-
CARB-1	0.45	1.96	0.26	1.13	0.034	0.15	6.87E-03	0.030	0.024	0.11	0.024	0.11	8.64E-06	3.78E-05	-	-	3.44E-07	1.51E-06
PDL	-	-	7.35E-03	2.20E-05	0.044	2.20E-05	-	-	-	-	-	-	4.41	0.71	-	-	-	-
ETU	-	-	-	-	-	-	-	-	20.98	91.90	6.17	27.03	2.00E-03	8.77E-03	2.00E-03	8.77E-03	-	-
Exhaust	-	-	-	-	-	-	-	-	19.22	84.20	5.65	24.76	-	-	-	-	-	-
GEN-1 [1]	9.00	39.40	5.18	22.68	0.47	2.07	1.71	7.48	0.30	0.074	0.30	0.074	0.038	0.16	-	-	6.95E-03	0.030
GEN-2 [1]	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	-	-	9.12E-03	0.040
GEN-3 [1]	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	-	-	9.12E-03	0.040
GEN-4 [1]	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	-	-	9.12E-03	0.040
GEN-5 [1]	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	-	-	9.12E-03	0.040
Pump-1 [1]	0.28	1.22	2.43	10.64	0.13	0.58	0.079	0.35	0.014	0.061	0.014	0.061	1.04E-03	4.55E-03	-	-	3.23E-04	1.42E-03
Pump-2 [1]	7.23	31.67	8.12	35.56	0.38	1.67	9.93E-03	0.04	0.41	1.78	0.41	1.78	1.30E-04	5.69E-04	-	-	4.04E-05	1.77E-04
Total	**76.52**	**335.17**	**50.28**	**220.21**	**4.20**	**18.20**	**10.77**	**47.16**	**50.77**	**213.07**	**16.84**	**64.44**	**4.65**	**1.75**	**2.00E-03**	**8.77E-03**	**0.044**	**0.19**

Controlled Emissions

Unit	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		Total HAPs		Hydrogen Fluoride		Formaldehyde	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
DUST-1	-	-	-	-	-	-	-	-	0.16	0.69	0.046	0.20	-	-	-	-	-	-
DUST-2	-	-	-	-	-	-	-	-	4.72E-05	2.07E-04	1.39E-05	6.08E-05	-	-	-	-	-	-
CARB-1	0.45	1.96	0.26	1.13	0.034	0.15	6.87E-03	0.030	0.024	0.11	0.024	0.11	8.64E-06	3.78E-05	-	-	3.44E-07	1.51E-06
PDL	-	-	7.35E-03	2.20E-05	0.044	2.20E-05	-	-	-	-	-	-	4.41	0.71	-	-	-	-
ETU	-	-	-	-	-	-	-	-	6.29E-03	0.028	1.85E-03	8.11E-03	2.00E-03	8.77E-03	2.00E-03	8.77E-03	-	-
Exhaust	-	-	-	-	-	-	-	-	5.77E-03	0.025	1.70E-03	7.43E-03	-	-	-	-	-	-
GEN-1 [1]	9.00	2.25	5.18	1.29	0.47	0.12	1.71	0.43	0.30	0.074	0.30	0.074	0.038	9.38E-03	-	-	6.95E-03	1.74E-03
GEN-2 [1]	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	-	-	9.12E-03	2.28E-03
GEN-3 [1]	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	-	-	9.12E-03	2.28E-03
GEN-4 [1]	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	-	-	9.12E-03	2.28E-03
GEN-5 [1]	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	-	-	9.12E-03	2.28E-03
Pump-1 [1]	0.28	0.069	2.43	0.61	0.13	0.033	0.079	0.020	0.014	3.47E-03	0.014	0.061	1.04E-03	2.60E-04	-	-	3.23E-04	8.08E-05
Pump-2 [1]	7.23	1.81	8.12	2.03	0.38	0.095	9.93E-03	2.48E-03	0.41	0.10	0.41	1.78	1.30E-04	3.25E-05	-	-	4.04E-05	1.01E-05
Total	**76.52**	**20.97**	**50.28**	**13.63**	**4.20**	**1.18**	**10.77**	**2.72**	**2.87**	**1.52**	**2.75**	**2.73**	**4.65**	**0.77**	**2.00E-03**	**8.77E-03**	**0.044**	**0.011**

Notes:

[1] Assumed PM = PM_{10} = $PM_{2.5}$

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HVAC Dust Collector Emissions

Unit ID:	DUST-1
Description:	Dust Collectors
Manufacturer:	Donaldson
Model:	DFE 4-32

Item	Value	Unit	Notes
Outlet Grain Loading:	0.002	gr/dscf	Filter Manufacturer Specification
Inlet Grain Loading:[1]	0.05	gr/dscf	Estimated uncontrolled
Baghouse Flow Capacity:	18000	acfm	Manufacturer Specification
Baghouse Flow Capacity:	18000	dscfm	Assumed to operate at STP
Filt. PM_{10} to Filt. PM Ratio	0.51	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3
Filt. $PM_{2.5}$ to Filt. PM Ratio	0.15	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3

[1] Drawing from Kairos's industry experience, a general assumption was made regarding the inlet grain loading. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust.

PM_{10} Safety Factor:	0%
$PM_{2.5}$ Safety Factor:	0%

Uncontrolled Emissions per Dust Collector					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	7.71			lb/hr	Grain loading (gr/dscf) * baghouse flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
		3.93	1.16	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**7.71**	**3.93**	**1.16**	**lb/hr**	
	33.79	**17.23**	**5.07**	**tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

Controlled Emissions per Dust Collector					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	0.31			lb/hr	Grain loading (gr/dscf) * baghouse flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
		0.16	0.05	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**0.31**	**0.16**	**0.046**	**lb/hr**	
	1.35	**0.69**	**0.20**	**tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

HVAC Dust Collector Emissions

Unit ID:	DUST-2
Description:	Dust Collectors
Manufacturer:	Donaldson
Model:	DFE 4-32
HEPA Filter Control Efficiency: [1]	99.97%

Item	Value	Unit	Notes
Outlet Grain Loading:	0.002	gr/dscf	Filter Manufacturer Specification
Inlet Grain Loading:[1]	0.05	gr/dscf	Estimated uncontrolled
Baghouse Flow Capacity:	18000	acfm	Manufacturer Specification
Baghouse Flow Capacity:	18000	dscfm	Assumed to operate at STP
Filt. PM_{10} to Filt. PM Ratio	0.51	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3
Filt. $PM_{2.5}$ to Filt. PM Ratio	0.15	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3

[1] Drawing from Kairos's industry experience, a general assumption was made regarding the inlet grain loading. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust.

PM_{10} Safety Factor:	0%
$PM_{2.5}$ Safety Factor:	0%

Uncontrolled Emissions					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	7.71			lb/hr	Grain loading (gr/dscf) * baghouse flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
		3.93	1.16	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**7.71** **33.79**	**3.93** **17.23**	**1.16** **5.07**	**lb/hr** **tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

Controlled Emissions					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	0.31			lb/hr	Grain loading (gr/dscf) * baghouse flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
		0.16	0.046	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Pre-HEPA Filter Emissions	0.31 1.35	0.16 0.69	0.046 0.20	lb/hr tpy	
Total Emissions	**9.26E-05** **4.05E-04**	**4.72E-05** **2.07E-04**	**1.39E-05** **6.08E-05**	**lb/hr** **tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

[1] Control efficiency was taken from the EPA article titled "What is a HEPA filter?" https://www.epa.gov/indoor-air-quality-iaq/what-hepa-filter

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Carbonizing Furnace Emissions

Unit ID: CARB-1
Description: Carbonizing Furnace
Quantity per annum 80 Batches/year
Duration per batch 48 hours/batch

Inlet Gas to CARB	**Propane (C3H8)**		
	Molar Ratio	1	
	MM	44	Kg/kmol
	Rho	493	kg/m3
	Flow rate	130	L/h
		0.13	m^3/h
		64.09	kg/h
		1.457	kmol/h

Unit (s): CARB-1
Description: Carbonizing Furnace

Engine Data			
Fuel consumption:	34.34	gal/hr	
	4.59	scf/hr	
	4.59E-06	MMscf/hr	Calculated
Operating hours:	8760	hrs/year	Continuous Operation

Uncontrolled Emissions							
NO_X	CO	VOC	SO_2	PM[1]	Total HAPs[2]	Units	Notes
13.00	7.50	1.00	0.20	0.70		lb/10^3 gal	AP-42 Table 1.5-1
			2.00			gr S/100 scf	Engineering Assumption
					1.88E+00	lb/MMscf	AP-42 Table 1.4-3
0.45	**0.26**	**0.034**	**6.87E-03**	**0.024**	**8.64E-06**	**lb/hr**	**Total**
1.96	**1.13**	**0.15**	**0.030**	**0.11**	**3.78E-05**	**tpy**	**Total**

Controlled Emissions							
NO_X	CO	VOC	SO_2	PM[1]	Total HAPs[2]	Units	Notes
13.00	7.50	1.00	0.20	0.70		lb/MMscf	AP-42 Table 1.5-1
			2.00			gr S/100 scf	Engineering Assumption
					1.88E+00	lb/MMscf	AP-42 Table 1.4-3
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	%	Control Efficiency
0.45	**0.26**	**0.034**	**6.87E-03**	**0.024**	**8.64E-06**	**lb/hr**	**Total**
1.96	**1.13**	**0.15**	**0.030**	**0.11**	**3.78E-05**	**tpy**	**Total**

Notes

[1] It is assumed that PM = PM_{10} = $PM_{2.5}$, PM emissions are derived from AP-42 emissions factors for LPG Combustion (Table 1.5-1) for Propane. Total = Filterable + Condensable.

[2] There are no HAP emission factors presented in AP-42 Section 1.5 Liquefied Petroleum Gas Combustion. Therefore, Total HAPs were calculated using AP-42 emissions factors for a Natural Gas Combustion (Table 1.4-3). Total HAPs calculated in table below.

HAP Calculations - AP-42 Table 1.4-3			
Compound	Emission Factor	Emissions	
	lb/MMscf	lb/hr	tpy
Benzene	2.10E-03	9.64E-09	4.22E-08
Toluene	3.40E-03	1.56E-08	6.84E-08
Formaldehyde	7.50E-02	3.44E-07	1.51E-06
Hexane	1.80E+00	8.26E-06	3.62E-05
Naphthalene	6.10E-04	2.80E-09	1.23E-08
Total		**8.64E-06**	**3.78E-05**

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PDL Lab Emissions

Unit: PDL
Description: Pebble Development Laboratory (PDL)

Uncontrolled Emissions																						
	NO_X		CO		VOC		SO_2		PM		PM_{10}		$PM_{2.5}$		HCl		Total HAPs		Formaldehyde		Radionuclides	
Unit	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PDL	-	-	7.35E-03	2.20E-05	4.41E-02	2.20E-05	-	-	-	-	-	-	-	-	-	-	4.41	0.71	-	-	-	-

Controlled Emissions																						
	NO_X		CO		VOC		SO_2		PM		PM_{10}		$PM_{2.5}$		HCl		Total HAPs		Formaldehyde		Radionuclides	
Unit	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PDL	-	-	7.35E-03	2.20E-05	4.41E-02	2.20E-05	-	-	-	-	-	-	-	-	-	-	4.41	0.71	-	-	-	-

3. Gaseous Emissions
3.1 Intermittent Emissions

This table lists the intermittent gas/vapor emission streams that are sent from the different processing areas of the Pebble Development Laboratory (PDL)

Rev.	Note	Ref	Area	Production Process	Subsystem	Source Equipment		P&ID number	Waste Description	Waste Characterisation (Main Composition)	Uranium content (kg U)	Classification (Note 1)	Operating Mode	Means of Transfer	Frequency of Release	Duration of Release	Release temperature (°C)	Release Pressure (kPag)	Flow rate			Total per annum (kg) (Note 3)	Destination
						Tag no.	Description												kg/h	kg/batch	m^3/h Note 2		
Intermittent Emission Streams																							
	2		PDL	Carbonizing	Carbonizing Furnace		Carbonizing Furnace		Off-gas of pebbles during heat treatment	CO	-		Abnormal	Internal to carbonizing furnace	During carbonizing furnace shutdown	~5-10 min	ambient - 850	0.0	3.33E-03	2.00E-02		2.00E-02	Atmosphere via process ventilation exhaust. See note 2
	2		PDL	Carbonizing	Carbonizing Furnace		Carbonizing Furnace		Off-gas of pebbles during heat treatment	Methane (CH4)	-		Abnormal	Internal to carbonizing furnace	During carbonizing furnace shutdown	~5-10 min	ambient - 850	0.0	3.33E-03	2.00E-02		2.00E-02	Atmosphere via process ventilation exhaust. See note 2
	2		PDL	Carbonizing	Carbonizing Furnace		Carbonizing Furnace		Off-gas of pebbles during heat treatment	Phenol	-		Abnormal	Internal to carbonizing furnace	During carbonizing furnace shutdown	~5-10 min	ambient - 850	0.0	3.33E-03	2.00E-02		2.00E-02	Atmosphere via process ventilation exhaust. See note 2
	2		PDL	Carbonizing	Carbonizing Furnace		Carbonizing Furnace		Off-gas of pebbles during heat treatment	P-benzylphenol	-		Abnormal	Internal to carbonizing furnace	During carbonizing furnace shutdown	~5-10 min	ambient - 850	0.0	3.33E-03	2.00E-02		2.00E-02	Atmosphere via process ventilation exhaust. See note 2
	2		PDL	Carbonizing	Carbonizing Furnace		Carbonizing Furnace		Off-gas of pebbles during heat treatment	4'4-isopropylidenediphenol	-		Abnormal	Internal to carbonizing furnace	During carbonizing furnace shutdown	~5-10 min	ambient - 850	0.0	3.33E-03	2.00E-02		2.00E-02	Atmosphere via process ventilation exhaust. See note 2

3.2 Final Emissions

This table lists the final gas/vapor emission streams that leave the Pebble Development Laboratory (PDL)

Rev.	Note	Ref	Area	Production Process	Subsystem	Source Equipment		BFD / P&ID number	Waste Description	Waste Characterisation (Main Composition)	Uranium content (kg U)	Classification (Note 1)	Operating Mode	Means of Transfer	Frequency of Release	Duration of Release	Release temperature (°C)	Release Pressure (kPag)	Flow rate			Total per annum (kg) (Note 3)	Destination
						Tag no.	Description												kg/h	kg/batch	m^3/h Note 2		
	3		PDL	Surrogate/TRISO Particle overcoating	Overcoater		Overcoater		Methanol/ethanol containing off-gas	Air (>99%) Methanol/ethanol (<1%) Graphite	-	F, T	Normal	Vent from equipment	per batch	2 hours	5 - ambient	0.0	2.00	4	16.7	640.0	Atmosphere via process ventilation exhaust

	4		PDL	Lab testing	Measing room and MGP room		Fume cupboard		Various small quantities of solvents and chemicals	Vapors forming from chemicals and solvents	-		Infrequent	Vent from fume cupboards	infrequent	infrequent	Ambient	0.0	-	-	-	Trace	Atmosphere via fume hood process ventilation exhaust
	4		PDL	Lab testing	Measing room and MGP room		Chemical store		Various small quantities of volatile solids	Volatile solids	-		Continuous	Vent from fume cupboards	infrequent	infrequent	Ambient	0.0	-	-	-	Trace	Atmosphere process ventilation exhaust
Balance of Plant Systems																							
	5		PDL	All	HVAC		HVAC Exhaust (Stack)		Exhaust air	100% Air		-	Normal	HVAC exhaust	Continuous	24 h/day 7 days/week	ambient	1 kPa	180000	-	180000		Release to atmosphere Note

Notes:

1

KEY to Classification Column	
E	Explosives
O	Oxidizing agents
F+	Extremely flammable
F	Highly flammable/Flammable
T+	Very toxic
T	Toxic
C	Corrosive
Xn	Harmful substances
Xi	Irritants
Rad.	Radioactive
Sens.	Sensitizers
Carc.	Carcinogens
Mut.	Mutagens
N	Dangerous to the environment

2 The total amount of gas generated during the entire carbonizing cycle. The degassing in the carbonizing furnace produces the following intermittent emissions that move internally to the thermal oxidizer of the carbonizing furnace before release to atmosphere by the process ventilation system one oxidized to CO2 and NOx, CO, Methane (CH4), Phenol, P-benzylphenol, 4'4-isopropylidenediphenol. In an abnormal event where the furnace will interlock into an emergency shut down mode, the entire furnace interlocks out and the thermal oxidizer as per sheet CARB-1 shuts down. At that moment, there could still be a slight release of off gas constituents in the furnace until it cools down; Estimated time of release would be 5-10 minutes. The release of the above constituents will be trace compared to the total 2.1 kg. The 5-10 minutes of off-gassing is anticipated to be released. There has been 1 case of emergency cooldown in 4 years of operation which occurred early into a run due to a loss of cooling water. The occurrence of this type of event is 1 in every 4 years currently based off operation. Assuming equal distribution of the off-gas species. (2.1kg over 35 hours) Each specie moving out uncontrolled will be 0.001kg/min total off-gas, 0.002kg/min per element.

3 At minimal conditions, the lowest process ventilation flow setting that will be required to maintain a methanol atmosphere in the overcoater below 25% of the LEL is 2cfm.
The process ventilation connected to the overcoater for process ventilation has a capacity of 100 cfm. This will be dampened for the overcoating process and always maintained above the 25% below LEL requirement.
Value provided for is total anticipated solvent removal per run, calculated per annum. The usage matches the requirement of the carbonizing furnace (CARB-1) of 80 batches per annum. A 100% safety factor was also appliec

4 Trace release of various volatile solids, solvents and chemicals stored int eh chemical store. This is an irregular occurrence and trace quantities at any time when used

5 Process ventilation rated at 3000cfm.

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

ETU-HVAC PM Emissions

Unit ID: ETU
Description: ETU-Exhaust

Item	Value	Unit	Notes
HEPA Control Efficiency [1]	99.97%	-	Filter Manufacturer Specification
Inlet Grain Loading:[1]	0.05	gr/dscf	Assumed
ETU Exhaust Flow Capacity:	96,000	acfm	Manufacturer Specification
ETU Exhaust Flow Capacity:	96,000	dscfm	Assumed to operate at STP
Annual Operating Hours	8760.00	hr	
Filt. PM_{10} to Filt. PM Ratio	0.51	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3
Filt. $PM_{2.5}$ to Filt. PM Ratio	0.15	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3

[1] Drawing from Kairos's industry experience, a general assumption was made regarding the inlet grain loading. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust.

PM_{10} Safety Factor: 0%
$PM_{2.5}$ Safety Factor: 0%

Uncontrolled Emissions from ETU Exhaust					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	41.14			lb/hr	Grain loading (gr/dscf) * ETU Exhaust flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
				lb/hr	HF lb/ft^3 * dscfm * 60 min / hr
		20.98	6.17	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**41.14**	**20.98**	**6.17**	**lb/hr**	
	180.21	**91.90**	**27.03**	**tpy**	lb/ hr * annual operating hours (hr/yr) / 2000 lbs / ton

Controlled Emissions from ETU Exhaust					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	0.01			lb/hr	Uncontrolled Emissions * 1-Control Efficiency
		0.01	0.00	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**0.012**	**6.29E-03**	**1.85E-03**	**lb/hr**	
	0.054	**0.028**	**8.11E-03**	**tpy**	lb/ hr * annual operating hours (hr/yr) / 2000 lbs / ton

[1] Control efficiency was taken from the EPA article titled "What is a HEPA filter?" https://www.epa.gov/indoor-air-quality-iaq/what-hepa-filter

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

ETU-HVAC HF Emissions

Unit ID: ETU
Description: ETU-Exhaust

Item	Value	Unit	Notes
ETU Argon Flow	10.00	scfm	Engineering Estimate
ETU Argon Flow	600.00	scf/hr	Calculated
HF Concentration at Air Purge Flow	40	ppm	Engineering Estimate
Mol % HF	0.00004	%	Calculated
Molecular Weight of Argon	39.948	lb/lbmol	
Density of Argon at Conditions	0.111	lb/scf	Provided by Kairos
Molecular Weight of HF	20.01	lb/lbmol	
Annual Operating Hours	8760.00	hr	

HF Safety Factor: 50%

Emissions from ETU Exhaust (HF Emissions are Uncontrolled)			
	HF	Units	Notes
Emission Factors	0.0013	lb/hr	scf/hr * lb/scf * mol% HF * MW HF / MW Ar
Total Emissions	**2.00E-03**	**lb/hr**	with Safety Factor
	8.77E-03	**tpy**	with Safety Factor

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

HVAC/Exhaust Emissions

Unit ID: Exhaust
Description: Building Exhaust

Item	Value	Unit	Notes
HEPA Control Efficiency [1]	99.97%	-	Filter Manufacturer Specification
Inlet Grain Loading:[1]	0.05	gr/dscf	Assumed
Building Exhaust Mass Flow	3000	kg/min	Based on Exhaust Specifications
Building Exhaust Mass Flow	6614	lb/min	Based on Exhaust Specifications
Building Air Density	0.0752	lb/scf	Assumed
Building Exhaust Flow	87,949	acfm	Manufacturer Specification
Exhaust Flow Capacity:	87,949	dscfm	Assumed to operate at STP
Filt. PM_{10} to Filt. PM Ratio	0.51	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3
Filt. $PM_{2.5}$ to Filt. PM Ratio	0.15	-	AP-42 Appendix B.2 Generalized Particle Size Distributions Table B.2.2 Category 3

[1] Drawing from Kairos's industry experience, a general assumption was made regarding the inlet grain loading. This assumption was based on the dust collector manufacturer's data, which indicates that the outlet grain loading would not exceed 0.002 gr/dscf. This assumption was utilized for the dust collectors, the ETU, and the building exhaust.

PM_{10} Safety Factor: 0%
$PM_{2.5}$ Safety Factor: 0%

Uncontrolled Emissions from Building Exhaust					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	37.69			lb/hr	Grain loading (gr/dscf) * Exhaust flow rate (dscfm) * 60 min/hr * 1lb / 7000 gr
		19.22	5.65	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**37.69**	**19.22**	**5.65**	**lb/hr**	
	165.09	**84.20**	**24.76**	**tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

Controlled Emissions from Building Exhaust					
	PM	PM_{10}	$PM_{2.5}$	Units	Notes
Emission Factors	0.01			lb/hr	Uncontrolled Emissions * (1-Control Efficiency)
		0.01	0.00	lb/hr	Filt. PM Ratio * Filterable PM Emission Factor
Total Emissions	**0.011**	**0.006**	**0.0017**	**lb/hr**	
	0.050	**0.025**	**0.0074**	**tpy**	lb/ hr * annual operating hours (8760 hrs/yr) / 2000 lbs / ton

[1] Control efficiency was taken from the EPA article titled "What is a HEPA filter?" https://www.epa.gov/indoor-air-quality-iaq/what-hepa-filter

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

Emergency Engine Emissions

Emission Unit:	GEN-1
Source Description:	Emergency Diesel fired generator
Manufacturer:	Caterpillar
Model:	CI8
Type:	N/A
Emission factors:	NSPS Tier 2

Fuel Consumption

Rated Engine Power	900	hp	Manufacturer Site Rating
	671	kW	
Fuel consumption	43.00	gal/hr	Assumed based on similar model
Max operating hours	8760	hr	
Requested Operating hours	500	hr	
Diesel Heat Value [1]	137,000	Btu/gal	
Heat Input:	5.89	MMBtu/hr	

Emissions Summary

	NO_x [2,5]	CO [2]	NMHC [2,5]	SO_2 [4]	PM_{10} [2]	Formaldehyde [3]	Acetaldehyde [3]	Acrolein [3]	Benzene [3]	E-Benzene [3]	Toluene [3]	Xylene [3]	Propylene [3]	1,3-Butadiene [3]	Naphthalene [3]	Total HAP	Units
Emission Factors	6.08	3.50	0.32	0.29	0.20	1.18E-03	7.67E-04	9.25E-05	9.33E-04	-	4.09E-04	2.85E-04	2.58E-03	3.91E-05	8.48E-05		g/kW-hr lb/MMBtu ppm
Hourly Totals	9.00	5.18	0.47	1.71	0.30	6.95E-03	4.52E-03	5.45E-04	5.50E-03	-	2.41E-03	1.68E-03	0.015	2.30E-04	5.00E-04	0.038	lb/hr
Annual Totals	39.40	22.68	2.07	7.48	1.30	0.030	0.020	2.39E-03	0.024	-	0.011	7.35E-03	0.067	1.01E-03	2.19E-03	0.164	ton/yr
Requested Emissions (lb/hr)	**9.00**	**5.18**	**0.47**	**1.71**	**0.30**	**6.95E-03**	**4.52E-03**	**5.45E-04**	**5.50E-03**	**-**	**2.41E-03**	**1.68E-03**	**1.52E-02**	**2.30E-04**	**5.00E-04**	**0.038**	**lb/hr**
Requested Emissions (500 hr/yr)	**2.25**	**1.29**	**0.12**	**0.43**	**0.074**	**1.74E-03**	**1.13E-03**	**1.36E-04**	**1.37E-03**	**-**	**6.02E-04**	**4.20E-04**	**3.80E-03**	**5.76E-05**	**1.25E-04**	**9.38E-03**	**ton/yr**

Notes

[1] Diesel heat value from Appendix A, AP 42

[2] Emissions factors are referenced from EPA NSPS Tier 2 emission factors for 560 ≤ kW < 900 rated power engines.

[3] HAPs emissions factors are referenced from AP-42 Table 3.3-1 & 3.3-2. HAPs include: Formaldehyde, Acetaldehyde, Acrolein, Benzene, Toluene, Xylene, Propylene, 1,3-Butadiene, and Naphthalene.

[4] SO_2 is calculated based on AP 42 Table 3.3-1.

[5] NO_X and NMHC are derived from NO_X+NMHC based on the assumption of 95% NO_X and 5% NMHC according to Table D-25 on California Environmental Protection Agency (CARB, Revised date: Dec 18, 2011)

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

Emergency Engine Emissions

Emission Unit:	GEN-2 through GEN-5
Source Description:	Emergency Diesel fired generator
Manufacturer:	Cummins
Model:	QST30-G5
Type:	N/A
Emission factors:	NSPS Tier 2

Fuel Consumption

Rated Engine Power	1490 1111	hp kW	Manufacturer Site Rating
Fuel consumption	56.40	gal/hr	Assumed based on similar model
Max operating hours	8760	hr	
Requested Operating hours	500	hr	
Diesel Heat Value [1]	137,000	Btu/gal	
Heat Input:	7.73	MMBtu/hr	

Emissions Summary																	
	NO_x [2,5]	CO [2]	NMHC [2,5]	SO_2 [4]	PM [2]	Formaldehyde [3]	Acetaldehyde [3]	Acrolein [3]	Benzene [3]	E-Benzene [3]	Toluene [3]	Xylene [3]	Propylene [3]	1,3-Butadiene [3]	Naphthalene [3]	Total HAP	Units
Emission Factors	6.08	3.50	0.32	0.29	0.20	1.18E-03	7.67E-04	9.25E-05	9.33E-04	-	4.09E-04	2.85E-04	2.58E-03	3.91E-05	8.48E-05		g/kW-hr lb/MMBtu ppm
Hourly Totals	14.89	8.57	0.78	2.24	0.49	9.12E-03	5.93E-03	7.15E-04	7.21E-03	-	3.16E-03	2.20E-03	1.99E-02	3.02E-04	6.55E-04	0.049	lb/hr
Annual Totals	65.23	37.55	3.43	9.81	2.15	3.99E-02	2.60E-02	3.13E-03	3.16E-02	-	1.38E-02	9.65E-03	8.73E-02	1.32E-03	2.87E-03	0.216	ton/yr
Requested Emissions (lb/hr)	**14.89**	**8.57**	**0.78**	**2.24**	**0.49**	**9.12E-03**	**5.93E-03**	**7.15E-04**	**7.21E-03**	**-**	**3.16E-03**	**2.20E-03**	**1.99E-02**	**3.02E-04**	**6.55E-04**	**0.049**	**lb/hr**
Requested Emissions (500 hr/yr)	**3.72**	**2.14**	**0.20**	**0.56**	**0.12**	**2.28E-03**	**1.48E-03**	**1.79E-04**	**1.80E-03**	**-**	**7.90E-04**	**5.51E-04**	**4.98E-03**	**7.55E-05**	**1.64E-04**	**0.0123**	**ton/yr**

Notes

[1] Diesel heat value from Appendix A, AP 42

[2] Emissions factors are referenced from EPA NSPS Tier 2 emission factors for > 900kW rated power engines.

[3] HAPs emissions factors are referenced from AP-42 Table 3.3-1 & 3.3-2. HAPs include: Formaldehyde, Acetaldehyde, Acrolein, Benzene, Toluene, Xylene, Propylene, 1,3-Butadiene, and Naphthalene.

[4] SO_2 is calculated based on AP 42 Table 3.3-1.

[5] NO_X and NMHC are derived from NO_X+NMHC based on the assumption of 95% NO_X and 5% NMHC according to Table D-25 on California Environmental Protection Agency (CARB, Revised date: Dec 18, 2011)

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

Diesel Pumps

Unit (s): Pump-1
Description: Diesel Fired Pump

Engine Data			
Capacity:	422	hp	Manufacturer specification
	315	kW	Converted from hp
Fuel heat value[1]:	137,000	Btu/gal	Appendix A, AP-42
Fuel consumption:	2.00	gal/hr	Assumed based on similar model
Heating rate:	0.27	MMBtu/hr	Calculated
Operating hours:	500	hrs/year	

Emission Summary							
NO_x[2]	CO[2]	VOC[2]	SO_2[3]	PM[2,4]	Total HAPs[5]	Units	Notes
0.40	3.5	0.19		0.02		g/kW-hr	NSPS Tier 4
			0.29		3.79E-03	lb/MMBtu	AP-42 Table 3.3-1 & 2
0.28	2.43	0.13	0.079	0.014	1.04E-03	lb/hr	Hourly Totals
1.22	10.64	0.58	0.35	0.061	4.55E-03	tpy	Annual Totals
0.28	**2.43**	**0.13**	**0.079**	**0.014**	**1.04E-03**	**lb/hr**	**Requested Emissions (lb/hr)**
0.069	**0.61**	**0.033**	**0.020**	**3.47E-03**	**2.60E-04**	**tpy**	**Requested Emissions (500 hr/yr)**

Notes

[1] Diesel heat value from Appendix A, AP 42

[2] Emissions factors are referenced from EPA NSPS Tier 4 emission factors for 225 ≤ kW < 450 rated power engines.

[3] SO_2 were calculated using AP-42 emissions factors for Diesel Industrial Engines (Table 3.3-1).

[4] It is assumed that PM = PM_{10} = $PM_{2.5}$.

[5] Total HAPs were calculated using AP-42 emissions factors for a Diesel Industrial Engines (Table 3.3-2). Total HAPs calculated in table below.

HAP Calculations - AP-42 Table 3.3-2			
Compound	Emission Factor	Emissions	
	lb/MMbtu	lb/hr	tpy
Benzene	9.33E-04	2.56E-04	6.39E-05
Toluene	4.09E-04	1.12E-04	2.80E-05
Xylenes	2.85E-04	7.81E-05	1.95E-05
1,3-Butadiene	3.91E-05	1.07E-05	2.68E-06
Formaldehyde	1.18E-03	3.23E-04	8.08E-05
Acetaldehyde	7.67E-04	2.10E-04	5.25E-05
Acrolein	9.25E-05	2.53E-05	6.34E-06
Naphthalene	8.48E-05	2.32E-05	5.81E-06
Total		**1.04E-03**	**2.60E-04**

Kairos Power

Kairos Power, LLC - Kairos Power Southwest facility

Diesel Pumps

Unit (s): Pump-2
Description: Diesel Fired Pump

Engine Data			
Capacity:	3	hp	Manufacturer specification
	2	kW	Converted from hp
Fuel heat value:	137,000	Btu/gal	Appendix A, AP-42
Fuel consumption:	0.25	gal/hr	Assumed based on similar model
Heating rate:	0.034	MMBtu/hr	Calculated
Operating hours:	500	hrs/year	

Emission Summary							
NO_x[2,3]	CO[2]	VOC[2,3]	SO_2[4]	PM[2,5]	Total HAPs[6]	Units	Notes
7.13	8.0	0.38		0.40		g/kW-hr	NSPS Tier 4
			0.29		3.79E-03	lb/MMBtu	AP-42 Table 3.3-1 & 2
7.23	8.12	0.38	9.93E-03	0.41	1.30E-04	lb/hr	Hourly Totals
31.67	35.56	1.67	0.044	1.78	5.69E-04	tpy	Annual Totals
7.23	**8.12**	**0.38**	**9.93E-03**	**0.41**	**1.30E-04**	**lb/hr**	**Requested Emissions (lb/hr)**
1.81	**2.03**	**0.095**	**2.48E-03**	**0.10**	**3.25E-05**	**tpy**	**Requested Emissions (500 hr/yr)**

Notes

[1] Diesel heat value from Appendix A, AP 42

[2] Emissions factors are referenced from EPA NSPS Tier 4 emission factors for kW < 8 rated power engines.

[3] NO_X and NMHC are derived from NO_X+NMHC based on the assumption of 95% NO_X and 5% NMHC according to Table D-25 on California Environmental Protection Agency (CARB, Revised date: Dec 18, 2011)

[4] SO_2 were calculated using AP-42 emissions factors for Diesel Industrial Engines (Table 3.3-1).

[4] It is assumed that PM = PM_{10} = $PM_{2.5.}$

[6] Total HAPs were calculated using AP-42 emissions factors for a Diesel Industrial Engines (Table 3.3-2). Total HAPs calculated in table below.

HAP Calculations - AP-42 Table 3.3-2			
Compound	**Emission Factor**	**Emissions**	
	lb/MMbtu	**lb/hr**	**tpy**
Benzene	9.33E-04	3.20E-05	7.99E-06
Toluene	4.09E-04	1.40E-05	3.50E-06
Xylenes	2.85E-04	9.76E-06	2.44E-06
1,3-Butadiene	3.91E-05	1.34E-06	3.35E-07
Formaldehyde	1.18E-03	4.04E-05	1.01E-05
Acetaldehyde	7.67E-04	2.63E-05	6.57E-06
Acrolein	9.25E-05	3.17E-06	7.92E-07
Naphthalene	8.48E-05	2.90E-06	7.26E-07
Total		**1.30E-04**	**3.25E-05**

2.5 Supporting Information

- Current version of AP-42 located online at: US EPA AP-42 Compilation of Air Emissions Factors
  - Specific sections used in this application:
    - AP-42 Chapter 1.4: Natural Gas Combustion – Table 1.4-3
    - AP-42 Chapter 1.5: Liquefied Petroleum Gas Combustion – Table 1.5-1
    - AP-42 Chapter 3.3: Gasoline and Diesel Industrial Engines – Tables 3.3-1 & 3.3-2
    - AP-42 Appendix A: Miscellaneous Data and Conversion Factors
    - AP-42 Appendix B.2: Generalized Particle Size Distributions – Table B.2.2
- EPA Nonroad Compression-Ignition Engines: Exhaust Emission Standards (March 2016)
- CARB The Carl Moyer Program Guidelines (Revised December 18, 2011) Table D-26
- Safety Data Sheets
  - Flibe

1.4 Natural Gas Combustion

1.4.1 General[1-2]

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

1.4.2 Firing Practices[3-5]

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

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

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

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

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

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylcholanthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
207-08-9	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D
74-98-6	Propane	1.6E+00	E

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

1.5 Liquefied Petroleum Gas Combustion

1.5.1 General[1]

Liquefied petroleum gas (LPG or LP-gas) consists of propane, propylene, butane, and butylenes; the product used for domestic heating is composed primarily of propane. This gas, obtained mostly from gas wells (but also, to a lesser extent, as a refinery by-product) is stored as a liquid under moderate pressures. There are three grades of LPG available as heating fuels: commercial-grade propane, engine fuel-grade propane (also known as HD-5 propane), and commercial-grade butane. In addition, there are high-purity grades of LPG available for laboratory work and for use as aerosol propellants. Specifications for the various LPG grades are available from the American Society for Testing and Materials and the Gas Processors Association. A typical heating value for commercial-grade propane and HD-5 propane is 90,500 British thermal units per gallon (Btu/gal), after vaporization; for commercial-grade butane, the value is 97,400 Btu/gal.

The largest market for LPG is the domestic/commercial market, followed by the chemical industry (where it is used as a petrochemical feedstock) and the agriculture industry. Propane is also used as an engine fuel as an alternative to gasoline and as a standby fuel for facilities that have interruptible natural gas service contracts.

1.5.2 Firing Practices[2]

The combustion processes that use LPG are very similar to those that use natural gas. Use of LPG in commercial and industrial applications may require a vaporizer to provide the burner with the proper mix of air and fuel. The burner itself will usually have different fuel injector tips as well as different fuel-to-air ratio controller settings than a natural gas burner since the LPG stoichiometric requirements are different than natural gas requirements. LPG is fired as a primary and backup fuel in small commercial and industrial boilers and space heating equipment and can be used to generate heat and process steam for industrial facilities and in most domestic appliances that typically use natural gas.

1.5.3 Emissions[1,3-5]

1.5.3.1 Criteria Pollutants -

LPG is considered a "clean" fuel because it does not produce visible emissions. However, gaseous pollutants such as nitrogen oxides (NO_x), carbon monoxide (CO), and organic compounds are produced as are small amounts of sulfur dioxide (SO_2) and particulate matter (PM). The most significant factors affecting NO_x, CO, and organic emissions are burner design, burner adjustment, boiler operating parameters, and flue gas venting. Improper design, blocking and clogging of the flue vent, and insufficient combustion air result in improper combustion and the emission of aldehydes, CO, hydrocarbons, and other organics. NO_x emissions are a function of a number of variables, including temperature, excess air, fuel and air mixing, and residence time in the combustion zone. The amount of SO_2 emitted is directly proportional to the amount of sulfur in the fuel. PM emissions are very low and result from soot, aerosols formed by condensable emitted species, or boiler scale dislodged during combustion. Emission factors for LPG combustion are presented in Table 1.5-1.

Table 1.5-1 presents emission factors on a volume basis ($lb/10^3 gal$). To convert to an energy basis (lb/MMBtu), divide by a heating value of 91.5 $MMBtu/10^3 gal$ for propane and 102 $MMBtu/10^3 gal$ for butane.

1.5.3.2 Greenhouse Gases[6-11] -

Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions are all produced during LPG combustion. Nearly all of the fuel carbon (99.5 percent) in LPG is converted to CO_2 during the combustion process. This conversion is relatively independent of firing configuration. Although the formation of CO acts to reduce CO_2 emissions, the amount of CO produced is insignificant compared to the amount of CO_2 produced. The majority of the 0.5 percent of fuel carbon not converted to CO_2 is due to incomplete combustion in the fuel stream.

Table 1.5-1. EMISSION FACTORS FOR LPG COMBUSTION[a]

EMISSION FACTOR RATING: E

Pollutant	Butane Emission Factor ($lb/10^3$ gal)		Propane Emission Factor ($lb/10^3$ gal)	
	Industrial Boilers[b] (SCC 1-02-010-01)	Commercial Boilers[c] (SCC 1-03-010-01)	Industrial Boilers[b] (SCC 1-02-010-02)	Commercial Boilers[c] (SCC 1-03-010-02)
PM, Filterable [d]	0.2	0.2	0.2	0.2
PM, Condensable	0.6	0.6	0.5	0.5
PM, Total	0.8	0.8	0.7	0.7
SO_2[e]	0.09S	0.09S	0.10S	0.10S
NO_x[f]	15	15	13	13
N_2O[g]	0.9	0.9	0.9	0.9
CO_2[h,j]	14,300	14,300	12,500	12,500
CO	8.4	8.4	7.5	7.5
TOC	1.1	1.1	1.0	1.0
CH_4[k]	0.2	0.2	0.2	0.2

[a] Assumes PM, CO, and TOC emissions are the same, on a heat input basis, as for natural gas combustion. Use heat contents of 91.5 x 10^6 Btu/10^3 gallon for propane, 102 x 10^6 Btu/10^3 gallon for butane, 1020 x 10^6 Btu/10^6 scf for methane when calculating an equivalent heat input basis. For example, the equation for converting from methane's emissions factors to propane's emissions factors is as follows: lb pollutant/10^3 gallons of propane = (lb pollutant /10^6 ft^3 methane) * (91.5 x 10^6 Btu/10^3 gallons of propane) / (1020 x 10^6 Btu/10^6 scf of methane). The NO_x emission factors have been multiplied by a correction factor of 1.5, which is the approximate ratio of propane/butane NO_x emissions to natural gas NO_x emissions. To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12. SCC = Source Classification Code.

[b] Heat input capacities generally between 10 and 100 million Btu/hour.

[c] Heat input capacities generally between 0.3 and 10 million Btu/hour.

[d] Filterable particulate matter (PM) is that PM collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. For natural gas, a fuel with similar combustion characteristics, all PM is less than 10 µm in aerodynamic equivalent diameter (PM-10).

[e] S equals the sulfur content expressed in gr/100 ft^3 gas vapor. For example, if the butane sulfur content is 0.18 gr/100 ft^3, the emission factor would be (0.09 x 0.18) = 0.016 lb of SO_2/10^3 gal butane burned.

[f] Expressed as NO_2.

[g] Reference 12.

[h] Assuming 99.5% conversion of fuel carbon to CO_2.

[j] EMISSION FACTOR RATING = C.

[k] Reference 13.

3.3 Gasoline And Diesel Industrial Engines

3.3.1 General

The engine category addressed by this section covers a wide variety of industrial applications of both gasoline and diesel internal combustion (IC) engines such as aerial lifts, fork lifts, mobile refrigeration units, generators, pumps, industrial sweepers/scrubbers, material handling equipment (such as conveyors), and portable well-drilling equipment. The three primary fuels for reciprocating IC engines are gasoline, diesel fuel oil (No.2), and natural gas. Gasoline is used primarily for mobile and portable engines. Diesel fuel oil is the most versatile fuel and is used in IC engines of all sizes. The rated power of these engines covers a rather substantial range, up to 250 horsepower (hp) for gasoline engines and up to 600 hp for diesel engines. (Diesel engines greater than 600 hp are covered in Section 3.4, "Large Stationary Diesel And All Stationary Dual-fuel Engines".) Understandably, substantial differences in engine duty cycles exist. It was necessary, therefore, to make reasonable assumptions concerning usage in order to formulate some of the emission factors.

3.3.2 Process Description

All reciprocating IC engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 methods used for stationary reciprocating IC engines: compression ignition (CI) and spark ignition (SI). This section deals with both types of reciprocating IC engines. All diesel-fueled engines are compression ignited, and all gasoline-fueled engines are spark ignited.

In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.3.3 Emissions

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the

Table 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO_x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03[d]	0.99[d]	6.68 E-03	0.95	D
SO_x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10[b]	7.21 E-04	0.10	2.20 E-03	0.31	D
CO_2[c]	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC					
Exhaust	0.015	2.10	2.47 E-03	0.35	D
Evaporative	6.61 E-04	0.09	0.00	0.00	E
Crankcase	4.85 E-03	0.69	4.41 E-05	0.01	E
Refueling	1.08 E-03	0.15	0.00	0.00	E

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 µm aerodynamic diameter. All particulate is assumed to be ≤ 1 µm in size.

[c] Assumes 99% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR UNCONTROLLED DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene[b]	9.33 E-04
Toluene[b]	4.09 E-04
Xylenes[b]	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene[b,c]	<3.91 E-05
Formaldehyde[b]	1.18 E-03
Acetaldehyde[b]	7.67 E-04
Acrolein[b]	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene[b]	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,l)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

[a] Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.
[c] Based on data from 1 engine.

APPENDIX A

MISCELLANEOUS DATA AND CONVERSION FACTORS

TYPICAL PARAMETERS OF VARIOUS FUELS[a]

Type Of Fuel	Heating Value		Sulfur % (by weight)	Ash % (by weight)
	kcal	Btu		
Solid Fuels				
Bituminous Coal	7,200/kg	13,000/lb	0.6-5.4	4-20
Anthracite Coal	6,810/kg	12,300/lb	0.5-1.0	7.0-16.0
Lignite (@ 35% moisture)	3,990/kg	7,200/lb	0.7	6.2
Wood (@ 40% moisture)	2,880/kg	5,200/lb	N	1-3
Bagasse (@ 50% moisture)	2,220/kg	4,000/lb	N	1-2
Bark (@ 50% moisture)	2,492/kg	4,500/lb	N	1-3[b]
Coke, Byproduct	7,380/kg	13,300/lb	0.5-1.0	0.5-5.0
Liquid Fuels				
Residual Oil	$9.98 \times 10^6/m^3$	150,000/gal	0.5-4.0	0.05-0.1
Distillate Oil	$9.30 \times 10^6/m^3$	140,000/gal	0.2-1.0	N
Diesel	$9.12 \times 10^6/m^3$	137,000/gal	0.4	N
Gasoline	$8.62 \times 10^6/m^3$	130,000/gal	0.03-0.04	N
Kerosene	$8.32 \times 10^6/m^3$	135,000/gal	0.02-0.05	N
Liquid Petroleum Gas	$6.25 \times 10^6/m^3$	94,000/gal	N	N
Gaseous Fuels				
Natural Gas	$9,341/m^3$	1,050/SCF	N	N
Coke Oven Gas	$5,249/m^3$	590/SCF	0.5-2.0	N
Blast Furnace Gas	$890/m^3$	100/SCF	N	N

[a] N = negligible.
[b] Ash content may be considerably higher when sand, dirt, etc., are present.

APPENDIX B.2

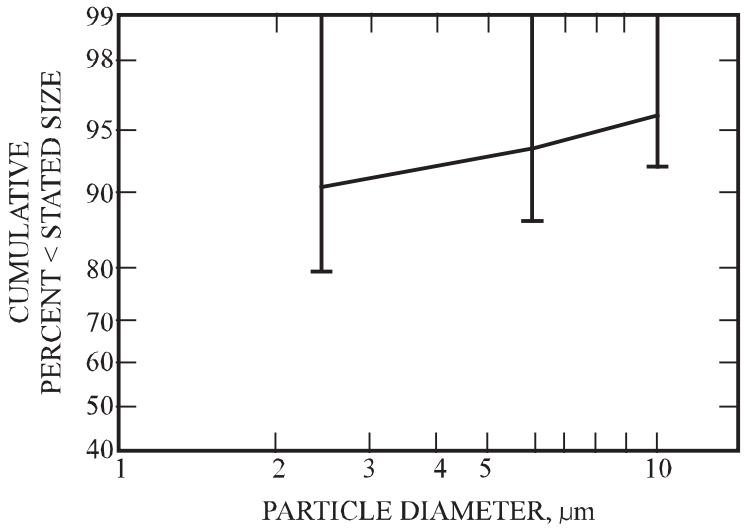
GENERALIZED PARTICLE SIZE DISTRIBUTIONS

Table B.2-2. DESCRIPTION OF PARTICLE SIZE CATEGORIES

Category: 1
Process: Stationary Internal Combustion Engines
Material: Gasoline and Diesel Fuel

Category 1 covers size-specific emissions from stationary internal combustion engines. The particulate emissions are generated from fuel combustion.

REFERENCES: 1,9



Particle Size, μm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	82			
2.0[a]	88			
2.5	90	78	99	11
3.0[a]	90			
4.0[a]	92			
5.0[a]	93			
6.0	93	86	99	7
10.0	96	92	99	4

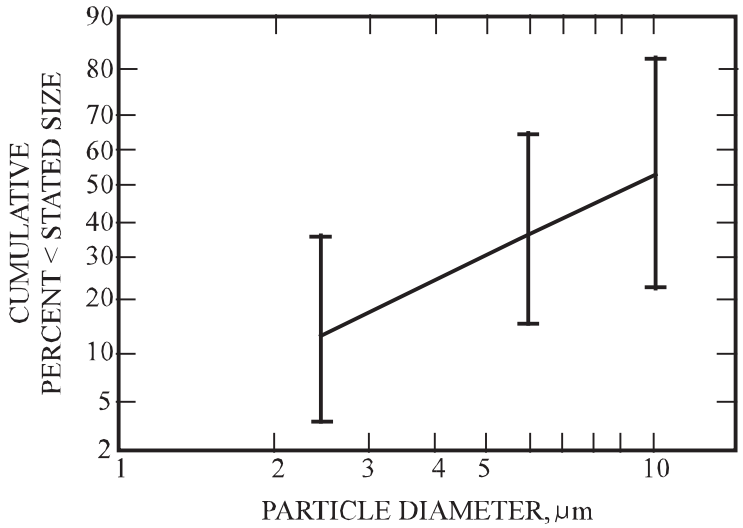
[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

Table B.2.2 (cont.).

Category: 3
Process: Mechanically Generated
Material: Aggregate, Unprocessed Ores

Category 3 covers material handling and processing of aggregate and unprocessed ore. This broad category includes emissions from milling, grinding, crushing, screening, conveying, cooling, and drying of material. Emissions are generated through either the movement of the material or the interaction of the material with mechanical devices.

REFERENCES: 1-2,4,7



Particle Size, µm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	4			
2.0[a]	11			
2.5	15	3	35	7
3.0[a]	18			
4.0[a]	25			
5.0[a]	30			
6.0	34	15	65	13
10.0	51	23	81	14

[a] Value calculated from data reported at 2.5, 6.0, and 10.0 µm. No statistical parameters are given for the calculated value.

Nonroad Compression-Ignition Engines: Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) [g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) [g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Continued

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr	NOx (g/kW-hr	PM (g/kW-hr	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 [j]	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 [j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 [j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 [k]	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			

Notes on following page.

Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations: Code of Federal Regulations (CFR) citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

THE CARL MOYER PROGRAM GUIDELINES

Approved Revisions 2011






Approved by the Board: April 28,

2011 Revised Date: December 18,

California Environmental Protection Agency

Air Resources Board

APPENDIX D

TABLES FOR EMISSION REDUCTION AND COST-EFFECTIVENESS CALCULATIONS

REFERENCES

The information in these tables has already been incorporated into the preceding emission factor tables. These tables are included for informational purposes.

Table D-25
Pollutant Fractions
NOx+NMHC
Standards

Diesel Engines		Alternative Fuel Engines	
NOx	NMHC	NOx	NMHC
0.95	0.05	0.80	0.20

Table D-26
Fuel Correction Factors
On-Road Diesel Engines

Model Year	NOx	PM10	HC
Pre- 2007	0.93	0.72	0.72
2007+	0.93	0.80	0.72

Table D-27
Fuel Correction Factors
Off-Road Diesel Engines

Model Year	NOx	PM10
Pre-Tier 1	0.930	0.720
Tier 1+	0.948	0.800

Table D-28
Conversion Factors for NOx, ROG and PM10
Heavy-Duty Vehicle Projects (bhp-hr/mile)

Model Year	Medium Heavy-Duty 14,001-33,000 lbs	Heavy Heavy-Duty 33,000 lbs +	Urban Bus 33,000 lbs +
Pre-1989	1.9	3.1	4.0
1990 - 1993	1.8	3.0	4.0
1994 - 1995	1.8	2.9	4.0
1996+	1.8	2.9	4.0

Donaldson Company, Inc.
Industrial Air Filtration
1400 West 94th Street
Bloomington, MN
55431-2370

Mailing Address:
P.O. Box 1299
Minneapolis, MN
55440-1299 U.S.A.

Tel 952-887-3847
Fax 952-698-2479
www.Donaldson.com
www.donaldsontorit.com

Donaldson Company, Inc. Emissions Statement for Industrial Dust Collectors with Ultra-Web® Filter Media

Donaldson Company, Inc. offers an extensive variety of dust collectors and filter media designs to the market to address the wide variety of dust control applications and project needs.

Because dust control projects sometimes demand unique collector selection or location strategies or may involve complex filter media performance considerations it is difficult to make general statements of emission performance. However, Donaldson generally expects total (filterable) particulate emissions from Continuous-Duty Cartridge Collectors using Donaldson Ultra-Web filter media to be capable of achieving average emission levels of no more than 0.002 grains per dry standard cubic foot. This level of performance expectation excludes any contributions to emissions from condensable materials (*which will pass through filter media in a vapor state*), and it assumes filters are installed properly and are operated and maintained in accordance with industry best practice and in accordance with the manufacturer's Installation, Operation, and Maintenance manuals for the collector.

Factors which may contribute to unexpected collector emissions include: misuse, accident, abuse, modification, improper installation or operation, inadequate maintenance, and operation beyond recommended selection/sizing guidance or useful life. Emissions may also occur as a result of damage to collectors or filters due to accidents, fires, corrosion, abrasion, or other physical abuse.

Emission performance is also influenced by the style or size of collector selected, by the selection of filter media, and by choices in accessories or features for collectors.

Important Notice: Many factors beyond the control of Donaldson can affect the use and performance of Donaldson products in a particular application, including the conditions under which the product is used. Since these factors are uniquely within the user's knowledge and control, it is essential the user evaluate the Donaldson products to determine whether the product is fit for the particular purpose and suitable for the user's application. This Emissions Statement shall not be construed as or relied upon as a health and safety statement. Donaldson does not require or recommend exhausting emissions into the indoor environment without consultation with a qualified professional to evaluate and address all attendant health and safety risks. It shall be the end user's continued and sole responsibility to provide a safe and healthful environment for its employees.

Donaldson's terms and conditions of sale, as stated in our current quotation, contain the sole obligation and exclusive remedy for any issues that arise regarding information that Donaldson provides in this statement.

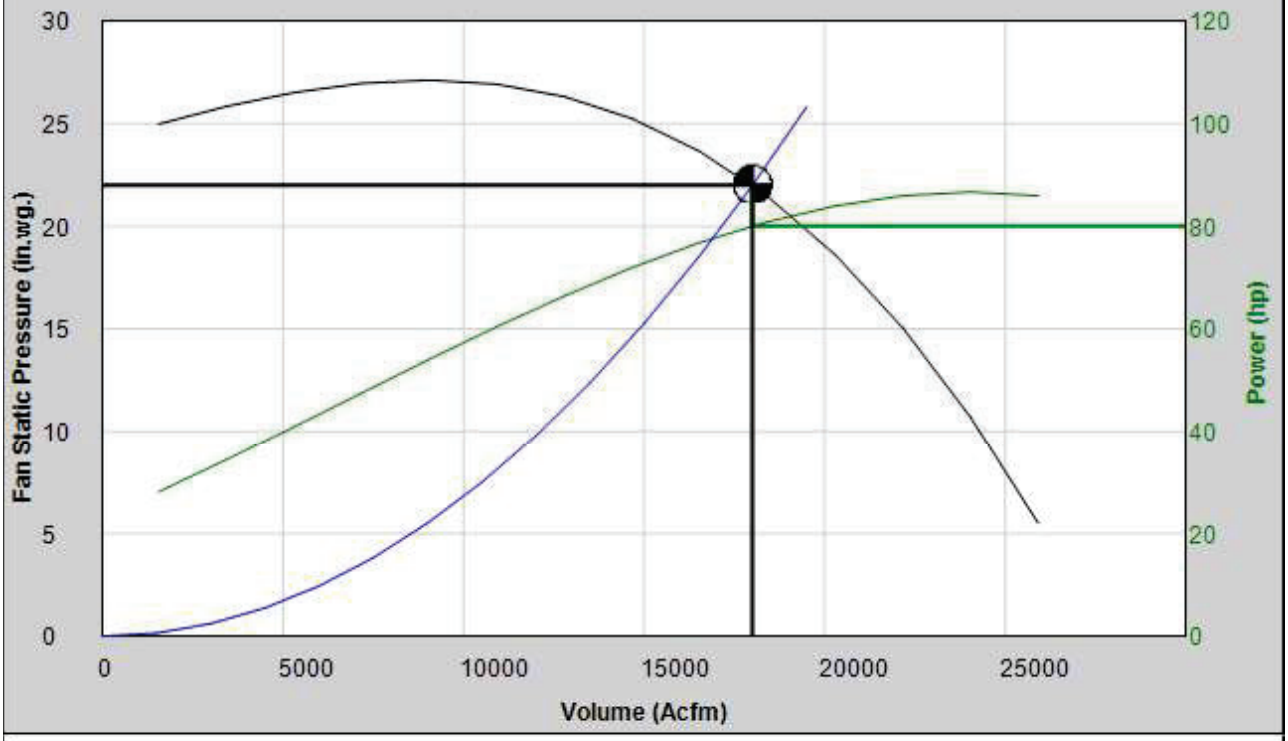
AirPro
AirProFan.com

Fan Performance Curve

Fan Type: BCMS

Size:	300	**Volume:**	18000 Acfm
Width:	100 %	**Fan Static Pressure:**	22 in.wg.
Speed:	2779 rpm	**Density:**	0.0596 lb/ft3
Fan Shaft Power:	80.1 hp	**Inlet Pressure:**	-22 in.wg.
Cold Start BHP:	80.1 hp	**Cold Start Temp.:**	70 F
Static Efficiency:	78 %	**Temperature:**	70 F
Class:	Class 40	**Elevation:**	4500 ft

Performance and Power indicated do not include drive losses.



---------- Static Pressure ---------- Power ---------- System Resistance

Sound Data

Noise levels based on Hemispherical Free Field conditions.
(Directivity = 2, Measurement Distance = 3ft)

Octave Band	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Lw dB	114	110	114	112	108	104	104	97
Lp dB	107	103	107	105	101	97	97	90

Overall Predicted Noise Level = 107 dBA (Open Inlet)

Kairos Power

ETU – HVAC

Requirements & Design Criteria

- 0.06” – 0.08” W.C. negative pressure
- 100% OA (no recirculated/return air)
- HEPA Filtration on exhaust
- Ventilation: provides heat removal and dilution of potentially hazardous gases
- Designed for 0.4% annual cumulative frequency of occurrence
  - 95°F DB cooling & 20°F DB heating (specific to Albuquerque, NM) – ASHRAE data
- KP-MEMO-000258 listed minimum air change required of 5 ach and >11 for heat gains
  - Selected 12 ach (based on cfm required for cooling load)

Air Change Method

$$63' * 70' * 100' = 441{,}000 ft^3$$

$$441{,}000 ft^3 * \mathbf{12\ ach} * \frac{1}{60} = 88{,}250\ cfm$$

Cooling Load Method

$$External\ Loads + Internal\ Loads = 1{,}404{,}000\ btuh\ (411\ kW)$$

Constant Indoor temperature @ 78°F; cfm between 85,000 & 90,000

Requirements & Design Criteria

- Achieve negative pressure via flow offset (exhaust > supply)
- Offset should be 5% - 10%; exhaust sized between 95,000 & 97,000 cfm
- Ductwork to be sized to not exceed 0.1 pressure drop or between 1800 and 2200 fpm at duct mains
- Exhaust fan to be of the upblast fan type w/ stack; shall include:
  - Air Treatment Unit (by AAF Flanders most likely)
  - Pre-filter
  - HEPA filter
  - HEGA/Carbon filter

Quote Ref: AF230704AP1
Date: 07-07-2023

Technical Scope of Supply

Description:

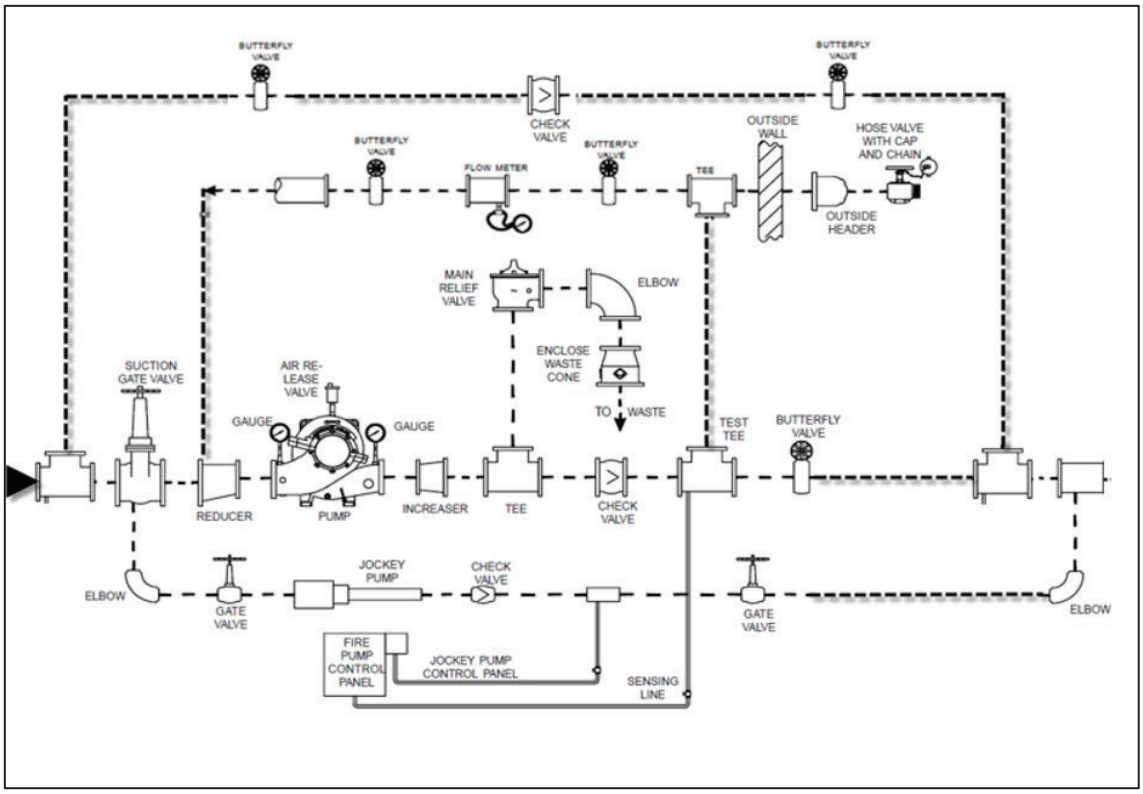
A pre-fabricated plant with fire suppression pump station shall be provided which includes a main horizontal split case fire pump rated at **[3500 USgpm @95 PSIG]**, fire control panel, jockey pump rated at **[35 USgpm @105 PSIG]**, jockey control panel, electrical connection(s) within enclosure, and valves and fittings as required by the NFPA 20.

Installation of this pre-fabricated pump plant must comply with NFPA 20, 2016 edition, sections 4.13.1.1, 4.13.1.2, and 4.13.1.3. This plant must be located 50ft from the building or have a physical separation of 2hr rated construction material between the enclosure and the building.

Project Services:

Project Management
Engineering Design and Technical Submittal
Operation and Maintenance Manuals

Sample Flow Diagram: (Not for construction-items may be missing)



Submittal Process:

2 to 3 weeks from order: Outline submittals - Data Sheet, Block Layout, Schematic / P&ID.
3 to 4 weeks from order: Full technical submittal (Detailed Drawings, Schematic, Manufacturers Details, etc.).
I&O Manual: On commissioning

Sizes and Weights:	
Approx. Size (s)	212 inches (L) x 156 inches (W) x 140 inches (H)
Delivered in	one section
Approx. Weights (s)	40,500 lbs (shipping weight)

Equipment Items:	
Item	**Description / Notes**
DIESEL FIRE PUMP: Pump model: HSC 14x10x20F 422 hp Pump rated flow: 3500 usgpm Pump rated head: 95 psi Rated speed: 1780 rpm Fire pump listing/approval: UL/FM Pump flange rating: ANSI 125lb Suction/125lb Discharge Impeller diameter: 15.13 in Close valve pressure: 106.4 psi Maximum suction pressure: 59 psi Maximum working pressure: 165.4 psi **Diesel Engine** Installation location: U.S. or U.S. territories Manufacturer: Clarke Model: JW6H-UFAD80 Listing: UL/FM Rated Speed: 1760 rpm Rated Horsepower: 422 hp Pump room ambient temp: 100 °F Installation altitude: 5312 ft Engine derated horsepower: 350 hp Battery system: Cables, rack and batteries Battery voltage: 12V Battery System Exhaust system: Silencer and flexible connection Exhaust muffler size: 6 in Flanged 150lb Fuel system: Fuel tank with flame arrestor and fittings Fuel tank type: Double Wall Fuel tank size: 300 US Gallon Type of cooling system: Heat exchanger FM approved cooling loop: Installed on engine as per NFPA. Block heater power rating: 230V/1/60 **Options:** Testing: Non-Witnessed Certified Fire Pump Performance Test Pump Suction Orientation: Right Double Wall: 300 US Gallon Shaft and Sleeve: Standard Fuel Leak Sensor Switch	**DIESEL FIRE PUMP CONTROLLER** Manufacturer: EATON Model Number: FD120 Controller Type: Diesel Power Rating: 230/1/60 Approvals: UL/FM Controller options: Standard Enclosure R4 - Low Pump room Temperature Switch Fuel Level Switch: S1 - 16 in

JOCKEY FIRE PUMP: Flow: 20 USgpm Head: 105 Psi Pump details: 4700 - VMS-05:06B - 2p - 3 hp - (Factory Choice Motor) Motor details: 3 hp; 208/3/60; NEMA Premium 12.12; ODP Fluid: Non-Potable Water Fluid properties: Sp.Gr: 1.0000; Viscosity: 31 SSU; Temp: 60 ˚F Operation: Single Connections: ANSI-250 Flanges	**JOCKEY CONTROLLER:** Manufacturer: EATON Model Number: XTJP-G07 Controller Type: AcrossTheLine Power Rating: 208/3/60 Horsepower: 3 hp NEMA 2 - Standard Enclosure
ACCESSORIES/FEATURES: 1 X Flow Meter and Flow Meter Loop 1 X City bypass loop 1 X Main Relief Valve and Waste Cone	**DETAILS:** Pump shall be accompanied with OS&Y for suction, supervisor butterfly valve for discharge, check valve, casing relief valve, test-header connection (terminated at wall). SUCTION CONNECTION: 12-inch DISCHARGE CONNECTION: 12-inch
ENCLOSURE (included): Enclosure Control panel Indoor lights. External light. Exit sign. Double door. Air Inlet Louver. Exhaust fan. Electrical outlets. Electric heater. Fuel Tank Leak Detection	**STANDARDS OF CONSTRUCTION:** Premium Enclosure: Floor plate and Floor insulation included. Wind Rating: 120 mph Snow Load: 50 lbs/sq-ft. **Options included:** Stamped Seismic calculations for superstructure.

MATERION

SAFETY DATA SHEET

1. Identification

Product identifier LiF-NaF-KF

Other means of identification

SDS number 2JT

Materion Code 2JT

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name Materion Advanced Chemicals Inc.

Address 407 N 13th Street
1316 W. St. Paul Avenue
Milwaukee, WI 53233
United States

Telephone 414.212.0257

E-mail advancedmaterials@materion.com

Contact person Noreen Atkinson

Emergency phone number Chemtrec 800.424.9300

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 2
	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, repeated exposure	Category 1
Environmental hazards	Hazardous to the aquatic environment, long-term hazard	Category 2
OSHA defined hazards	Not classified.	

Label elements

Signal word Danger

Hazard statement Fatal if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. May cause respiratory irritation. Causes damage to organs through prolonged or repeated exposure. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Immediately call a poison center/doctor. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Take off contaminated clothing and wash it before reuse. Collect spillage.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	11.5% of the mixture consists of component(s) of unknown acute dermal toxicity. 42% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 42% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment. For further information, please contact the Product Stewardship Department at +1.800.862.4118.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Potassium Fluoride (KF)		7789-23-3	42
Sodium Fluoride (NaF)	Sodium fluoride (NaF) Sodium monofluoride	7681-49-4	11.5

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation. Prolonged exposure may cause chronic effects.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Potassium Fluoride (KF) (CAS 7789-23-3)	PEL	2.5 mg/m3
Sodium Fluoride (NaF) (CAS 7681-49-4)	PEL	2.5 mg/m3

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value	Form
Potassium Fluoride (KF) (CAS 7789-23-3)	TWA	2.5 mg/m3	Dust.
Sodium Fluoride (NaF) (CAS 7681-49-4)	TWA	2.5 mg/m3	Dust.

US. ACGIH Threshold Limit Values

Components	Type	Value
Potassium Fluoride (KF) (CAS 7789-23-3)	TWA	2.5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium Fluoride (NaF) (CAS 7681-49-4)	TWA	2.5 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Potassium Fluoride (KF) (CAS 7789-23-3)	TWA	2.5 mg/m3
Sodium Fluoride (NaF) (CAS 7681-49-4)	TWA	2.5 mg/m3

US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants

Components	Type	Value
Potassium Fluoride (KF) (CAS 7789-23-3)	PEL	2.5 mg/m3
Sodium Fluoride (NaF) (CAS 7681-49-4)	PEL	2.5 mg/m3

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Potassium Fluoride (KF) (CAS 7789-23-3)	3 mg/l	Fluoride	Urine	*
	2 mg/l	Fluoride	Urine	*
Sodium Fluoride (NaF) (CAS 7681-49-4)	3 mg/l	Fluoride	Urine	*
	2 mg/l	Fluoride	Urine	*

* - For sampling details, please see the source document.

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection Wear appropriate chemical resistant gloves.

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state Solid.

Form Solid.

Color Not available.

Odor Not available.

Odor threshold Not available.

pH	Not available.
Melting point/freezing point	1558.76 °F (848.2 °C) estimated
Initial boiling point and boiling range	2735.6 °F (1502 °C) estimated
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	0.00001 hPa estimated
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	2.67 g/cm3 estimated
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Specific gravity	2.67 estimated

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Ingestion	Fatal if swallowed. Causes digestive tract burns.

Symptoms related to the physical, chemical and toxicological characteristics Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.

Information on toxicological effects

Acute toxicity Fatal if swallowed.

Components	Species	Test Results
Potassium Fluoride (KF) (CAS 7789-23-3)		
Acute		
Oral		
LD50	Rat	245 mg/kg
Sodium Fluoride (NaF) (CAS 7681-49-4)		
Acute		
Oral		
LD50	Mouse	44.3 mg/kg
	Rat	32 mg/kg

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Potassium Fluoride (KF) (CAS 7789-23-3)	3 Not classifiable as to carcinogenicity to humans.
Sodium Fluoride (NaF) (CAS 7681-49-4)	3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. Causes damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity Toxic to aquatic life with long lasting effects.

Product		Species	Test Results
LiF-NaF-KF			
Aquatic			
Crustacea	EC50	Daphnia	1113.0435 mg/l, 48 hours estimated
Fish	LC50	Fish	2264.5342 mg/l, 96 hours estimated

Components		Species	Test Results
Sodium Fluoride (NaF) (CAS 7681-49-4)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	98 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	108 - 150 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of any ingredients in the mixture.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN3288
UN proper shipping name	Toxic solid, inorganic, n.o.s. (Potassium Fluoride (KF))
Transport hazard class(es)	
Class	6.1(PGIII)
Subsidiary risk	-
Label(s)	6.1
Packing group	III
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB8, IP3, T1, TP33
Packaging exceptions	153
Packaging non bulk	213
Packaging bulk	240

IATA

UN number	UN3288
UN proper shipping name	Toxic solid, inorganic, n.o.s. (Potassium Fluoride (KF))
Transport hazard class(es)	
Class	6.1(PGIII)
Subsidiary risk	-
Packing group	III
Environmental hazards	No.
ERG Code	6L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft	Allowed with restrictions.
Cargo aircraft only	Allowed with restrictions.

IMDG

UN number	UN3288
UN proper shipping name	TOXIC SOLID, INORGANIC, N.O.S. (Potassium Fluoride (KF))
Transport hazard class(es)	
Class	6.1(PGIII)
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-A
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

DOT

IATA; IMDG

General information: IMDG Regulated Marine Pollutant. DOT Regulated Marine Pollutant.

15. Regulatory information

US federal regulations: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Toxic Substances Control Act (TSCA)

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium Fluoride (NaF) (CAS 7681-49-4) Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes
Classified hazard categories	Acute toxicity (any route of exposure) Skin corrosion or irritation Serious eye damage or eye irritation Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

16. Other information, including date of preparation or last revision

Issue date	12-18-2018
Version #	01
Disclaimer	Materion Advanced Chemicals Inc. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. This document has been prepared using data from sources considered to be technically reliable and the information is believed to be correct. Materion makes no warranties, expressed or implied, as to the accuracy of the information contained herein. Materion cannot anticipate all conditions under which this information and its products may be used and the actual conditions of use are beyond its control. The user is responsible to evaluate all available information when using this product for any particular use and to comply with all Federal, State, Provincial and Local laws, statutes and regulations.

3. OPERATIONAL PLAN – AIR EMISSIONS DURING SSM

The KPSW facility is owned and operated by Kairos Power, LLC. For general maintenance of the equipment at the KPSW facility, Kairos will have a small team of facility management staff and maintenance technicians. Kairos will rely on contractors for the bulk of the preventive and reactive maintenance support which will include:

- Absolute Mechanical (mechanical & plumbing)
- Yearout Mechanical (ETU HVAC)
- B&D Industries (electrical)
- Apic Solutions (fire alarm systems)
- Mesa Detection (security & fire watch)
- Elevated Fire (current and future fire pumps)
- American Fire Protection Group (fire sprinkler system & hydrants)
- Duke City Maintenance (custodial)
- Brightview (grounds)
- ALC West (HVAC controls)
- Trane (HVAC controls)
- Clean Harbors (ETU exhaust BIBO work)

The following presents an analysis of emissions associated with start-up, shutdown, and maintenance activities for each source, along with the measures that Kairos will implement to minimize emissions during these events. Additionally, the procedures that Kairos will follow in the event of a malfunction, which may result in the emission of regulated air contaminants exceeding permit limits, are also outlined below.

PEBBLE DEVELOPMENT LABORATORY EMISSIONS (UNIT PDL) OVER COATER

- **Start-up:** There are no expected increased emissions from start-up as this is a manual process.
- **Shut-down:** There are no expected increased emissions from shut-down as this is a manual process. **Maintenance:** There are no expected increased emissions from maintenance as this is a manual process.
- **Malfunctions:** The volume of methanol at is fully controlled by manually adding methanol to the processes. In any abnormal event, the operator will immediately stop adding methanol and thereby emissions are immediately stopped.

CARBONIZING FURNACE EMISSIONS (UNIT CARB-1)

The operation of the carbonizing furnace is fully automated except for loading and unloading of product.

- **Start-up:** When the carbonizing process is initiated, a set of pre-defined automated integrity tests are completed including a vacuum test and pressure test to ensure the system is operational and there are no leaks in the system. There are no expected increased emissions from startup.
- **Shut-down:** There are no expected increased emissions from shutdown.
- **Maintenance:** There are no expected increased emissions from maintenance.
- **Malfunctions:** In any abnormal condition/event such as loss of power, loss of nitrogen, loss of cooling water, there are automated protocols in place:
  - In the loss of power: the furnace is fully interlocked with UPS power to ensure the furnace is controlled and cools down to a safe state.
  - In a loss of nitrogen, there is a redundant argon bottle coupled to the furnace to ensure that there is inert gas locked in the furnace until full cool down.
  - In the loss of coolant water inert gas flow will prevent oxygen from entering the furnace and producing oxidation emissions.

When a malfunction occurs, in addition to the items above, the thermal oxidizer is shut off and the furnace is sealed, all control valves fail shut, with injection of inert gas. At that point, the off gassing of the product would decrease over the next ten minutes at which point it would stop eliminating all emissions.

ENGINEERING TESTING UNIT HVAC EMISSIONS (UNIT ETU)

- **Start-up:** There are no expected increased emissions from start-up. The HEPA filters are always in place and there is a backup available if the first filter fails. HF emissions occur during the startup of the unit and are not expected exceed the permit limits.
- **Shut-down:** There are no expected increased emissions from shut-down.
- **Maintenance:** There are no expected increased emissions from maintenance.
- **Malfunctions:** In the event of a malfunction the system is turned off immediately reducing emissions. Any increased particulate material will be caught by the HEPA filter. HF is not expected to exceed the permit limits.

HVAC DUST COLLECTORS EMISSIONS (UNITS DUST-1 AND DUST-2)

- **Start-up:** There are no expected increased emissions from start-up. The HEPA filters are always in place and there is a backup available if the first filter fails.
- **Shut-down:** There are no expected increased emissions from shut-down.
- **Maintenance:** There are no expected increased emissions from maintenance.
- **Malfunctions:** In the event of a malfunction the system is turned off immediately.

EMERGENCY GENERATOR EMISSIONS (UNITS GEN-1 THROUGH GEN-5)

- **Start-up:** Engine startup is completed following manufacturer's instructions, including pre-startup checklists. The exhaust is monitored, for an excess of white and/or black smoke. If this is observed the engine is shutdown.
- **Shut-down:** Engine shutdown is completed following manufacturer's instructions. The exhaust is monitored, for an excess of white and/or black smoke. If this is observed the engine is taken offline for repairs.
- **Maintenance:** Kairos has contracted Cummins to complete the regular maintenance per the manufacturer's recommendations. The exhaust is monitored, for an excess of white and/or black smoke. If this is observed the engine is taken offline for repairs.
- **Malfunctions:** In the event of a malfunction the engine is taken offline for repairs.

4. AIR DISPERSION MODELING ANALYSIS

The following pages contain the information below regarding air dispersion modeling analysis for the KPSW facility:

- Air Dispersion Modeling Report
- Email from CABQ EHD of Approval of the Submitted Modeling Protocol

AIR DISPERSION MODELING REPORT

Permit Modification Application
ATC Permit #1958-M1-1AR

Kairos Power, LLC
Kairos Power Southwest facility

Prepared By:

Adam Erenstein – Principal Consultant

TRINITY CONSULTANTS
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Albuquerque, NM 87122
(505) 266-6611

December 2024

Project 233201.0125

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I. APPLICANT AND CONSULTANT INFORMATION

This modeling report is being submitted as part of a permit modification application submitted pursuant to 20.2.11.41.29 NMAC for the Kairos Power Southwest (KPSW) facility, which is owned and operated by Kairos Power, LLC (Kairos). This report and accompanying modeling files are being submitted to the City of Albuquerque (CABQ) Environmental Health Department (EHD), Air Quality Program (AQP) to satisfy the requirements of 20.11.41.13.E NMAC. This report includes all required components requested in the "Completeness Requirements" section of the CABQ's Air Dispersion Modeling Guidelines (published May 2024)[1].

a. Name of Facility and Company

Facility Name: Kairos Power Southwest
Company: Kairos Power, LLC

b. Permit Numbers Currently Registered for the Facility

This facility operates under **ATC #1958-M1-1AR**.

c. Contact Information for Modeling Questions

Contact Name: Adam Erenstein
Phone Number: (505) 266-6611
E-mail Address: AErenstein@trintiyconsultants.com

[1] Air Dispersion Modeling Guidelines For Air Quality Permitting, City of Albuquerque, Environmental Health Department, Air Quality Program (Revised May 2024)

II. FACILITY AND OPERATIONS DESCRIPTION

a. Narrative Summary of Proposed Modification

This facility is proposing to add additional sources of emissions associated with graphite machining and fuel development. Details of the permit modification are included below.

The proposed modification includes:

- The installation of the following units:
  - Two (2) dust collectors (units DUST-1 & DUST-2)
  - One (1) carbonizing furnace (unit CARB-1)
  - One (1) Pebble Development Laboratory (unit PDL)
  - Three (3) engineering testing units (all under unit ETU)
  - Seven (7) building exhaust vents (all under unit Exhaust)
  - One (1) diesel fired pump (Pump-2).
- The replacement of the following unit:
  - One (1) 183 hp diesel fired pump (unit 12) with one (1) 422 hp diesel fired pump (unit Pump-1) with a 3 hp diesel jockey pump (unit Pump-2)
- The modification of the following units:
  - Five (5) emergency diesel fired generators (GEN-1 through GEN-5)

Pump-1, Pump-2, and GEN-1 through GEN-5 operate for 500 hours per year and are classified as intermittent sources. These sources are thus exempt from modeling. The PDL and CARB-1 share the same vent stack, therefor, their emissions will be combined in the air dispersion modeling.

b. Brief Physical Description of the Location

The Kairos Power Southwest facility is currently located at 5201 Hawking DR SE, Albuquerque, NM 87106 (UTM Zone 13, 352,990 m E and 3,874,795 m N).

c. Duration of Time that the Facility will be Located at This Location

The facility will be at this location for more than one (1) year.

d. Facility Maps (Google Earth Imagery Dated 8/19/2024)

Please note that there is no fenceline located at this facility.

Figure 1. Location of the Facility

Figure 2. Location of On-Site Buildings

Figure 3. Location of Emission Points

III. MODELING REQUIREMENTS DESCRIPTION

a. List of Pollutants Requiring NAAQS and/or NMAAQS Modeling

This air dispersion modeling evaluation is for a permit modification that will authorize the addition of point sources with combustion emissions and volume sources. As such, averaging periods will be evaluated for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. There are no sources of lead or H_2S at this facility and therefore these pollutants will not be modeled.

Table 1. Modeled Pollutants and Averaging Periods to Show Compliance with the NAAQS and NMAAQS

Pollutant	Averaging Periods	Waiver Granted	Modeled
CO	8-hr		☑
	1-hr		☑
H_2S	1/2-hr		
Pb	Quarterly		
NO_2	Annual		☑
	24-hr		☑
	1-hr		☑
$PM_{2.5}$	Annual		☑
	24-hr		☑
PM_{10}	Annual		☑
	24-hr		☑
SO_2	Annual		☑
	24-hr		☑
	3-hr		☑
	1-hr		☑

b. Additional Modeling Required

No additional New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), or Prevention of Significant Deterioration (PSD) modeling is required as part of this modification application. The KPSW facility is located in an area that is classified by the EPA as in attainment with the National Ambient Air Quality Standard (NAAQS) for all regulated pollutants.

IV. MODELING INPUTS

a. General Modeling Approach

i. Models Used and Justification

The most recent executable of AERMOD (v23132) was used to perform all air dispersion modeling. All models were run in regulatory default mode and Building Profile Input Program (BPIP) Prime was run to address building downwash associated with the tanks and structures located at this facility as well as the surrounding area.

ii. Operational Flexibility

No operational flexibility is required for the modeling of the KPSW facility.

iii. Source Groups

All units were modeled simultaneously. The FAC source group includes all of the KPSW facility sources while the NAAQS source group in the CIA models includes the addition of the surrounding sources.

iv. Hourly Emission Factors

No hourly emission factors were used as part of the air dispersion modeling evaluation. All lb/hr values were calculated as the maximum and conservative concentration for each of the sources.

v. Gravitational Settling/Plume Depletion

Wet and dry depletion were not used to model ambient impacts of PM_{10} and $PM_{2.5}$.

vi. Reduction of NO_x to NO_2

The Tier 2, Ambient Ratio Method 2 (ARM2) was used to model ambient impacts of NO_2. The national default minimum ambient ratio of 0.5 and maximum ambient ratio of 0.9 was used.

vii. Background Concentrations

Initially, the proposed background concentrations consisted of using the South Valley monitor data for CO, $PM_{2.5}$, and PM_{10} and the Del Norte monitor data for NO_2 and SO_2. However, in the Attachment C: Background Values Memo [2] of the latest CABQ EHD modeling guidelines, it is stated "background values for all pollutants should normally come from the Del Norte monitor and be used across the Albuquerque metro area within the jurisdiction of the Air Quality Program."

Background concentrations shown in Table 2 have been added to the calculated facility and neighboring source impacts for each pollutant and averaging period. These background concentrations were provided by the Air Quality Program (AQP) via email on December 29, 2023 and have been preserved as provided.

[2] Air Dispersion Modeling Guidelines For Air Quality Permitting, City of Albuquerque, Environmental Health Department, Air Quality Program (Revised May 2024) (Attachment C, page 22)

Table 2. Background Concentrations from the Del Norte Monitor

Pollutant	Averaging Periods	Value ($\mu g/m^3$)
CO	8-hr	1336
	1-hr	1870
NO_2	Annual	18
	1-hr	83.1
$PM_{2.5}$	Annual	6.4
	24-hr	16.0
PM_{10}	24-hr	22.9
SO_2	Annual	0
	24-hr	0
	1-hr	13.1

viii. Method for Demonstrating Compliance in Nearby Facilities

Discrete receptors were included in all surrounding sources and facilities. Receptors were only deleted inside the KPSW facility building outline.

b. Meteorological and Ozone Data

i. Discussion of Meteorological and Ozone Data

The most recent meteorological data from the Albuquerque Airport from 2014 to 2018 provided by the CABQ was used for the air dispersion modeling. The airport is located nearby, and this meteorological data is assumed to be adequately representative of conditions at the KPSW facility.

ii. Actual Data

No further justification is required as the data was provided by the CABQ.

c. Receptor and Terrain Discussion

i. Spacing of Receptor Grids

The originally proposed receptor grid spacing was updated per the latest CABQ EHD modeling guidelines. The updated spacing is as follows:

- Fenceline: This facility does not have a fenceline.
- Very fine grid spacing: 50 meters from 0 meters to 500 meters of facility
- Fine grid spacing: 100 meters from 500 meters to 1000 meters of facility
- Course grid spacing: 250 meters from 1000 meters to 2500 meters of facility
- Very course grid spacing: 500 meters from 2500 meters to 5000 meters of facility

ii. Terrain Discussion

USGS National Elevation Dataset (NED) 1 arc-second data files were provided on the CABQ EHD dispersion modeling guidelines website[3]. These files were imported into AERMAP to determine elevations for sources, receptors, and buildings. There is no complex terrain requiring modifications to air dispersion modeling inputs.

iii. Reduction in Receptor Grid Size

The full receptor grid was utilized for all SIL models. Receptors not exceeding significance thresholds per Table 18 of the NMED Air Dispersion Modeling Guidelines were removed for all CIA modeling.

d. Emission Sources

i. Description of Sources at Facility

1. Source Types

Table 3. Modeled Point Source Types

Model ID	Description	Vertical	Horizontal	Rain Capped
DC1	Dust Collector	☑		
ETU1	Engineering Testing Unit	☑		
ETU2	Engineering Testing Unit	☑		
ETU3	Engineering Testing Unit	☑		
EX1	Building Exhaust	☑		
EX2	Building Exhaust	☑		
EX3	Building Exhaust	☑		
EX4	Building Exhaust	☑		
EX5	Building Exhaust	☑		
EX6	Building Exhaust	☑		
EX7	Building Exhaust	☑		
CARB1	Carbonizing Furnace	☑		

There are no area or volume sources located at this facility.

[3] City of Albuquerque. "Dispersion Modeling Guidelines." Air Quality Permits. https://www.cabq.gov/airquality/air-quality-permits/dispersion-modeling-guidelines

2. Emission Rates and Stack Parameters

Table 4. Source Emission Rates and Stack Parameters

ID	NO_2 (lb/hr)	CO (lb/hr)	SO_2 (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	Height (ft)	Temp. (°F)	Velocity (ft/s)	Diameter (ft)
DUST-1	0	0	0	0.16	0.046	38.00	Ambient	124.73	1.75
CARB-1	0.45	0.26	0.0069	0.024	0.024	38.00	300.00	127.32	1.00
ETU	0	0	0	0.0063	0.0019	20.00	100.00	22.45	5.50
Exhaust	0	0	0	0.0058	0.0017	38	Ambient	108.98	2.50

3. Summary of Actual and Modeled Dimensions of Volume Sources

There are no volume sourced located at the KPSW facility.

4. Table of Proposed Changes

Table 5. Modeled Emission Rates for Modified or New Sources

Model ID	NO_2 (lb/hr)	CO (lb/hr)	SO_2 (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
DC1	0	0	0	0.16	0.046
CARB1	0.45	0.26	0.0069	0.024	0.024
ETU1	0	0	0	0.0021	0.00062
ETU2	0	0	0	0.0021	0.00062
ETU3	0	0	0	0.0021	0.00062
EX1	0	0	0	0.00082	0.00024
EX2	0	0	0	0.00082	0.00024
EX3	0	0	0	0.00082	0.00024
EX4	0	0	0	0.00082	0.00024
EX5	0	0	0	0.00082	0.00024
EX6	0	0	0	0.00082	0.00024
EX7	0	0	0	0.00082	0.00024

5. Treatment of Operating Hours

No reductions were claimed to represent non-continuous annual operation for any of the emission sources located on site.

6. Particle Size Characteristics

No particle size distribution characteristics were included in the particulate matter modeling.

7. Discrepancies Between Modeled Parameters and Those in the Application

Modeled stack parameters and those represented in the application are identical.

8. Flare Calculations

There are no flares at the KPSW facility.

9. Cross-Reference of Model Input Numbers and Names

Table 6. Cross Reference of Model Input Names and Unit IDs

Unit ID	Description	Model ID
DUST-1	Dust Collector	DC1
CARB-1	Carbonizing Furnace	CARB1
ETU	Engineering Testing Unit 1	ETU1
	Engineering Testing Unit 2	ETU2
	Engineering Testing Unit 3	ETU3
Exhaust	Building Exhaust 1	EX1
	Building Exhaust 2	EX2
	Building Exhaust 3	EX3
	Building Exhaust 4	EX4
	Building Exhaust 5	EX5
	Building Exhaust 6	EX6
	Building Exhaust 7	EX7

e. Building Downwash

i. Dimension of Buildings

Table 7. Polygon Building Dimensions and Locations

Model ID	Description	X Coordinate (m)	Y Coordinate (m)	Height (ft)
BLDG1_1	KPSW Main Bldg	352972	3874893	32.5
		352966	3874688	
		352986	3874688	
		352993	3874695	
		352986	3874702	
		352987	3874710	
		353023	3874709	
		353028	3874892	
		352972	3874893	
BLDG1_2	KPSW_Lobby	353025	3874789	18.00
		353023	3874709	
		353048	3874709	

Model ID	Description	X Coordinate (m)	Y Coordinate (m)	Height (ft)
		353049	3874732	
		353041	3874733	
		353041	3874740	
		353038	3874740	
		353038	3874745	
		353034	3874745	
		353035	3874767	
		353032	3874767	
		353033	3874785	
		353027	3874785	
		353027	3874789	
		353025	3874789	
BLDG1_3	KPSW_Warehouse	352937	3874772	65.00
		352968	3874771	
		352972	3874893	
		352941	3874894	
		352937	3874772	
BLDG1_4	KPSW_Dipping Tower	352984	3874779	45.00
		352988	3874779	
		352988	3874772	
		352984	3874772	
		352984	3874779	
BLDG1_5	KPSW_Dipping Tower	353009	3874778	45.00
		353012	3874778	
		353012	3874772	
		353009	3874772	
		353009	3874778	
BLDG2	Other Kairos Building	352891	3874818	44.00
		352922	3874817	
		352923	3874908	
		352894	3874909	
		352891	3874818	
BLDG3	TDL Building	352876	3874725	43.00
		352879	3874725	
		352879	3874732	
		352906	3874732	
		352905	3874724	

Model ID	Description	X Coordinate (m)	Y Coordinate (m)	Height (ft)
		352908	3874724	
		352910	3874797	
		352908	3874797	
		352908	3874794	
		352881	3874795	
		352881	3874798	
		352878	3874798	
		352876	3874725	
BLDG4	Other Kairos Building	352905	3874926	27.00
		352942	3874925	
		352942	3874941	
		352905	3874941	
		352905	3874926	
BLDG5	Other Kairos Building	352848	3874826	20
		352866	3874826	
		352867	3874854	
		352849	3874855	
		352848	3874826	

ii. Discussion in Included and Excluded Buildings

The KPSW facility is one singular building with no fenceline. Neighboring buildings were included in the model following the GEP 5L area of influence where L is the lesser of the width or height dimension of the structure.

V. MODELING FILES DESCRIPTION

a. List of File Names

Table 8. Modeling Files and Description

Name	Description
KPSW_CO SIL_v2.0_2024 0917	CO 1hr and 8hr SIL model
KPSW_NO2 SIL_v2.0_2024 0917	NO_2 1hr, 24 hr, and Annual SIL model
KPSW_PM2.5 SIL_v2.0_2024 0917	$PM_{2.5}$ 24 hr and Annual SIL model
KPSW_PM10 SIL_v2.0_2024 0917	PM_{10} 24 hr and Annual SIL model
KPSW_SO2 SIL_v2.0_2024 0917	SO_2 1hr, 3 hr, 24 hr, and Annual SIL model
KPSW_NO2 1-hr NAAQS_v2.0_2024 0917	NO_2 1-hr NAAQS CIA model
KPSW_NO2 Ann NMAAQS_v2.0_2024 0917	NO_2 Annual NMAAQS CIA model
KPSW_PM2.5 Ann NAAQS_v2.0_2024 0917	$PM_{2.5}$ Annual NAAQS CIA model

b. Description of Scenarios

All files labeled "SIL" represent the Significance Impact Level models. Modeled concentrations were below the significance threshold for CO, NO_2, $PM_{2.5}$ 24-hr, PM_{10}, and SO_2. As such, cumulative impact analysis is not required for this facility. Modeled concentrations were above the significance threshold for all NO_2 averaging periods as well as the $PM_{2.5}$ annual averaging period. As such these pollutants and averaging periods require cumulative impact analysis. Per Table 19 of the NMED Modeling Guidelines, the NO_2 1-hr NAAQS model may be used as a surrogate for the NO_2 24-hr NMAAQS. Therefore, the NO_2 24-hr NMAAQS was not modeled. All files labeled "CIA" represent the Cumulative Impacts Analysis models.

VI. MODELING RESULTS

a. Summary of Modeling Results

Table 9. SIL Model Results, Maximum Concentration and Location, and Comparison to Significance Thresholds

Pollutant	Averaging Period	Significance Level (µg/m³)	Modeled Concentration (µg/m³)	Percent of Significance	Location of Maximum Concentration		Elevation (m)
					X	Y	
CO	8-hr	500	8.82	1.76%	352881	3874842	1613.73
	1-hr	2000	18.43	0.92%	352881	3874792	1613.23
NO_2	Annual	1.0	1.67	Significant	352931	3874742	1613.22
	24-hr	5.0	8.50	Significant	352931	3874742	1613.22
	1-hr	7.52	28.71	Significant	352881	3874792	1613.23
$PM_{2.5}$	Annual	0.13	0.21	Significant	352931	3874792	1613.22
	24-hr	1.2	0.84	69.87%	352931	3874792	1613.22
PM_{10}	Annual	1.0	0.52	51.93%	352931	3874792	1613.22
	24-hr	5.0	2.83	56.66%	352931	3874792	1613.22
SO_2	Annual	1.0	0.028	2.84%	352931	3874742	1613.22
	24-hr	5.0	0.14	2.90%	352931	3874742	1613.22
	3-hr	25	0.38	1.51%	352881	3874842	1613.73
	1-hr	7.8	0.49	6.27%	352881	3874792	1613.23

All modeled pollutants are below the significant level thresholds, with the exception of the NO_2 averaging periods and the $PM_{2.5}$ annual averaging period. According to Table 19 of the NMED Modeling Guidelines, modeling for the NO_2 annual NAAQS is not required, as the NO_2 annual NMAAQS can serve as a surrogate to demonstrate compliance. Similarly, modeling for the NO_2 24-hour NMAAQS is not necessary, as the NO_2 1-hr NAAQS will be used as a surrogate. Consequently, a cumulative impact analysis (CIA) was conducted for the NO_2 annual NMAAQS, the NO_2 1-hr NAAQS, and the $PM_{2.5}$ annual NAAQS. Modeling for all other pollutants and averaging periods is not required for the CIA.

Table 10. CIA Model Results and Comparison to NAAQS and NMAAQS

Pollutant, Averaging Period and Standard	Standard, (µg/m³)	Facility (µg/m³)	Facility & Surrounding Sources (µg/m³)	Background (µg/m³)	Total (µg/m³)	Percent of the Standard
NO_2 Annual NMAAQS	94.02	1.67	1.73	18	19.73	20.99%
NO_2 24-hr NMAAQS	188.03	The NO_2 1-hr model is used as a surrogate to demonstrate compliance with this standard.				

NO_2 1-hr NAAQS	188.03	27.33	27.45	83.1	110.55	58.79%
$PM_{2.5}$ Annual NAAQS	9.0	0.21	0.21	6.4	6.61	73.44%

After modeling the KPSW facility with all surrounding sources provided the CABQ EHD Modeling Department, as well as adding background concentration from the Del Norte $PM_{2.5}$ monitor, the facility and the region are below the standards for the NO_2 annual, the NO_2 1-hr, and the $PM_{2.5}$ the annual averaging periods.

VII. SUMMARY/CONCLUSIONS

a. Modeling Statement

The submitted air dispersion modeling and report demonstrate compliance with the National and New Mexico Ambient Air Quality Standards. All requirements have been satisfied. There are no exceedances which would prohibit approval of the permit modification.

b. Expected Permit Conditions

The facility is allowed to operate continuously with no additional permit conditions.

Daniel Dolce

From: Tumpane, Kyle <ktumpane@cabq.gov>
Sent: Thursday, July 18, 2024 3:08 PM
To: Daniel Dolce
Cc: Adam Erenstein; Terrence Williams; Stonesifer, Jeff W.; McKinstry, Michael W.
Subject: RE: Kairos KP-Southwest Facility Modeling Protocol Approval

Follow Up Flag: Follow up
Flag Status: Completed

Daniel,
Thank you for providing answers to the questions from the modeling protocol review.

The differences between uncontrolled and controlled emissions for the PDL source are still a little unclear to me but the full application and calculations may help with that. Also, the updated emission summary table shows zero NOx emissions from the PDL now when there were some NOx emissions before. Please be sure to explain the uncontrolled vs controlled emissions for this source, and others, thoroughly in the application and associated calculations.

I will send the surrounding sources data in a separate email shortly. Please submit the application and modeling as soon as you are ready.

Thank you,
Kyle

From: Daniel Dolce <Daniel.Dolce@trinityconsultants.com>
Sent: Monday, July 15, 2024 3:51 PM
To: Tumpane, Kyle <ktumpane@cabq.gov>
Cc: Adam Erenstein <AErenstein@trinityconsultants.com>
Subject: RE: Kairos KP-Southwest Facility Modeling Protocol Approval

Hi Kyle,

I apologize for the delay, but please find the responses to your comments in blue of the modeling protocol for the Kairos Power Southwest facility (KPSW) (Permit #1958-M1-1AR). Additionally, I have also attached the last version of our emissions summary table from the calculations as well as an updated aerial image of the facility. Please let me know if you have any additional questions or comments.

The City of Albuquerque Air Quality Program (AQP) has finished reviewing the modeling protocol submitted on April 11, 2024 on behalf of Kairos Power for the proposed modification to permit #1958-M1-1AR. The modeling protocol is approved with some questions and comments. The AQP does not need a second full protocol but answers are needed to the questions.

1. There is not a clear explanation of how the units in the Emission Summary table correspond to the modeled units shown in the figure on the page before. There are no CARB or TDL sources shown in the figure on PDF p.14. Where are these units going to be located or vented through? Are these units going to be vented through one of the emission points shown in the figure?

a. The CARB source is in the Model Inputs table, the TDL source is not, and neither are in the figure. If the TDL source has emissions, it seems like it should have model input parameters. If the emissions will not come from a stack, then the source type and parameters should be discussed.
    i. The CARB-1 unit is a source of emissions and was neglected from the PDF on pg. 14. Below is an updated aerial image which now includes the location of the CARB-1 unit. The "TDL" source was mislabeled and should be "PDL". The PDL is located within the main building itself and all emissions are sent through the building exhaust stacks (EX-1 through EX-7).

2. Why does DUST-2 show much lower controlled emissions than DUST-1 in the Emission Summary table even though they have the same uncontrolled emissions? In Attachment A, PDF p. 7, of the protocol it says that DUST-2 will not exhaust to the atmosphere so it seems like it should have zero controlled emissions. Is this table showing something different?
    a. DUST-2 emissions are re-routed to the facility after going through a HEPA filter so there is no exterior exhaust. Emissions are only present in the emissions summary table to show the reduction in PM emissions. However, these would be contained within the building and would not release to the atmosphere. Therefore, DUST-2 will not be modeled.
3. How does the TDL unit only have uncontrolled NOx emissions but then has controlled NOx, CO, HAPs and radionuclide emissions?
    a. The "TDL" source was mislabeled and should be "PDL". This facility instead has a Pebble Development Laboratory (PDL). Attached is an updated Emissions Summary table with this correction. The PDL is a batch operation. Uncontrolled emissions represent in between batch emissions (includes gas/vapor emission streams that are sent from the different processing areas of the PDL). Controlled emissions include all gas/vapor streams that leave the PDL during a batch operation.
4. Similarly, how does the ETU unit have controlled Total HAP emissions but no uncontrolled Total HAP emissions?
    a. The Total HAPs were neglected in the Uncontrolled Summary table in the protocol. Total HAP should equal HF emissions which are the same for controlled emissions.
5. A slight adjustment to receptor spacing is required. Receptor spacing at 25 meters along the building edge is good. The 25-meter spacing should continue out to the edge of the Kairos property. Then the receptor spacing can increase to 50 meters out to 500 meters from the edge of the property, 100 meters out to 1000 meters from the edge of the property, and so on as described.
    a. Trinity will be sure to adjust the spacing so that it aligns with the newly released modeling guidelines and the above mentioned description.
6. After re-examining background values and monitor locations, the AQP now recommends using background values from the Del Norte monitor for most modeling. This is the recommendation for this site. All background values except $PM_{2.5}$ should be correct already, but the $PM_{2.5}$ backgrounds still need to be updated after the bias correction is completed. AQP is still waiting for EPA to complete the correction so new backgrounds can be calculated. Kairos/Trinity could use the existing Del Norte $PM_{2.5}$ backgrounds and that would be conservative. We will let you know as soon as the updated values are available.
    a. The Del Norte monitor will be used for all pollutants modeled at this facility.

A follow-up email

I will be sent with the surrounding sources to be included in the modeling once answers are provided to the questions above to be sure appropriate surrounding sources are included.

Thank you and regards,
Daniel Dolce

Daniel Dolce
Associate Consultant

P 505.266.6611 M 505.818.8761
Email: daniel.dolce@trinityconsultants.com
9400 Holly Avenue NE, Building 3, Suite B, Albuquerque, NM 87122

From: Tumpane, Kyle <ktumpane@cabq.gov>
Sent: Friday, May 10, 2024 3:55 PM
To: Adam Erenstein <AErenstein@trinityconsultants.com>; Terrence Williams <williams@kairospower.com>
Cc: Stonesifer, Jeff W. <JStonesifer@cabq.gov>; McKinstry, Michael W. <mmckinstry@cabq.gov>; Lopez, Angela <angelalopez@cabq.gov>
Subject: Kairos KP-Southwest Facility Modeling Protocol Approval

Mr. Erenstein,

The City of Albuquerque Air Quality Program (AQP) has finished reviewing the modeling protocol submitted on April 11, 2024 on behalf of Kairos Power for the proposed modification to permit #1958-M1-1AR. The modeling protocol is approved with some questions and comments. The AQP does not need a second full protocol but answers are needed to the questions.

1. There is not a clear explanation of how the units in the Emission Summary table correspond to the modeled units shown in the figure on the page before. There are no CARB or TDL sources shown in the figure on PDF p.14. Where are these units going to be located or vented through? Are these units going to be vented through one of the emission points shown in the figure?
    a. The CARB source is in the Model Inputs table, the TDL source is not, and neither are in the figure. If the TDL source has emissions, it seems like it should have model input parameters. If the emissions will not come from a stack, then the source type and parameters should be discussed.

2. Why does DUST-2 show much lower controlled emissions than DUST-1 in the Emission Summary table even though they have the same uncontrolled emissions? In Attachment A, PDF p. 7, of the protocol it says that DUST-2 will not exhaust to the atmosphere so it seems like it should have zero controlled emissions. Is this table showing something different?

3. How does the TDL unit only have uncontrolled NOx emissions but then has controlled NOx, CO, HAPs and radionuclide emissions?

4. Similarly, how does the ETU unit have controlled Total HAP emissions but no uncontrolled Total HAP emissions?

5. A slight adjustment to receptor spacing is required. Receptor spacing at 25 meters along the building edge is good. The 25-meter spacing should continue out to the edge of the Kairos property. Then the receptor spacing can increase to 50 meters out to 500 meters from the edge of the property, 100 meters out to 1000 meters from the edge of the property, and so on as described.

6. After re-examining background values and monitor locations, the AQP now recommends using background values from the Del Norte monitor for most modeling. This is the recommendation for this site. All background values except $PM_{2.5}$ should be correct already, but the $PM_{2.5}$ backgrounds still need to be updated after the bias correction is completed. AQP is still waiting for EPA to complete the correction so new backgrounds can be calculated. Kairos/Trinity could use the existing Del Norte $PM_{2.5}$ backgrounds and that would be conservative. We will let you know as soon as the updated values are available.

A follow-up email will be sent with the surrounding sources to be included in the modeling once answers are provided to the questions above to be sure appropriate surrounding sources are included.

Let us know if you have any questions.

Thank you,

KYLE TUMPANE

senior environmental health scientist | environmental health department

o 505.768.2872

m 505.366.9985

cabq.gov/airquality

5. APPLICABLE REGULATIONS

5.1 Appliable City of Albuquerque Regulations

20.11.41 NMAC – Construction Permits

This facility is required to have a permit pursuant to 20.11.41.2 NMAC and is currently operating under ATC 1958-M1-1AR.

5.2 Applicable Federal Regulations

40 CFR 60 Subpart A – General Provisions

Those portions of the facility subject to 40 CFR 60 Subpart IIII are also subject to this NSPS.

40 CFR 60 Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

GEN-1 through GEN-5, and Pump-1 & 2 are stationary compression ignition (CI) internal combustion engines (ICE) constructed after July 11, 2005 and manufactured after April 1, 2006.

40 CFR 63 Subpart A – General Provisions

Those portions of the facility subject to 40 CFR 63 Subpart ZZZZ are also subject to this NESHAP.

40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

GEN-1 through GEN-5, and Pump-1 & 2 are stationary compression ignition (CI) internal combustion engines (ICE) constructed after July 11, 2005 and manufactured after April 1, 2006.

APPENDIX A. APPLICATION FORMS

The following pages contain:

- Air Quality Permit Application (updated February 2022)
- Permit Application Review Fee Checklist (Updated Review Fees for January 1, 2024 through December 31, 2024)
- Permit Application Checklist (Updated November 2023)
- Compliance History Disclosure Form (Updated March 1, 2024)

City of Albuquerque – Environmental Health Department
Air Quality Program

Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103**
or hand deliver between 8:00 am – 5:00 pm Monday – Friday to:
3rd Floor, Suite 3023 – One Civic Plaza NW, Albuquerque, NM 87102
(505) 768-1972 aqd@cabq.gov

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

Submittal Date: December 13, 2024

Owner/Corporate Information ☐ **Check here and leave this section blank if information is exactly the same as Facility Information below.**

Company Name: **Kairos Power, LLC**			
Mailing Address: **707 W. Tower Ave, Ste. A**	City: **Alameda**	State: **CA**	Zip: **95401**
Company Phone: **(510) 808-5265**	Company Contact: **Terrence Williams**		
Company Contact Title: **Director of Environmental Health and Safety**	Phone: **(510) 775-1822**	E-mail: **williams@kairospower.com**	

Stationary Source (Facility) Information: **Provide a plot plan (legal description/drawing of the facility property) with overlay sketch of facility processes, location of emission points, pollutant type, and distances to property boundaries.**

Facility Name: **Kairos Power Southwest**			
Facility Physical Address: **5201 Hawking Dr. SE**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Facility Mailing Address (if different): **N/A**	City: **N/A**	State: **N/A**	Zip: **N/A**
Facility Contact: **Terrence Williams**	Title: **Director of Environmental Health and Safety**		
Phone: **(510) 775-1822**	E-mail: **williams@kairospower.com**		
Authorized Representative Name[1]: **N/A**	Authorized Representative Title: **N/A**		

Billing Information ☒ **Check here if same contact and mailing address as corporate** ☒ **Check here if same as facility**

Billing Company Name: **Kairos Power, LLC**			
Mailing Address: **707 W. Tower, Ste. A**	City: **Alameda**	State: **CA**	Zip: **95401**
Billing Contact: **Max Schellhorn**	Title: **Accounts Payable Manager**		
Phone: **(510) 761-0724**	E-mail: **schellhorn@kairospower.com**		

Preparer/Consultant(s) Information ☐ **Check here and leave section blank if no Consultant used or Preparer is same as Facility Contact.**

Name: **Adam Erenstein**	Title: **Principal Consultant**		
Mailing Address: **9400 Holly Ave, Bldg. 3, Ste. B**	City: **Albuquerque**	State: **NM**	Zip: **87122**
Phone: **(505) 266-6611**	Email: **AErenstein@trinityconsultants.com**		

1. See 20.11.41.13(E)(13) NMAC.

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

General Operation Information (if any question does not pertain to your facility, type N/A on the line or in the box)

Permitting action being requested (please refer to the definitions in 20.11.40 NMAC or 20.11.41 NMAC):			
☐ New Permit	☒ Permit Modification Current Permit #: **1958-M1-1AR**	☐ Technical Permit Revision Current Permit #: **N/A**	☐ Administrative Permit Revision Current Permit #: **N/A**
☐ New Registration Certificate	☐ Modification Current Reg. #: **N/A**	☐ Technical Revision Current Reg. #: **N/A**	☐ Administrative Revision Current Reg. #: **N/A**
UTM coordinates of facility (Zone 13, NAD 83): **352,990 m E and 3,874,795 m N**			
Facility type (*i.e.*, a description of your facility operations): **Manufacturing (graphite and fuel development)**			
Standard Industrial Classification (SIC Code #): **3443**		North American Industry Classification System (NAICS Code #): **332410**	
Is this facility currently operating in Bernalillo County? **Yes**		If **YES**, list date of original construction: **N/A** If **NO**, list date of planned startup: **N/A**	
Is the facility permanent? **Yes**		If **NO**, list dates for requested temporary operation: From **N/A** Through **N/A**	
Is the facility a portable stationary source? **No**		If **YES**, is the facility address listed above the main permitted location for this source? **N/A**	
Is the application for a physical or operational change, expansion, or reconstruction (*e.g.*, altering process, or adding, or replacing process or control equipment, etc.) to an existing facility? **Yes**			
Provide a description of the requested changes: **The addition of two (2) dust collectors, one (1) carbonizing furnace, one (1) TRISO development lab, one (1) engineering testing unit, building exhaust vents, and two (2) diesel pumps.**			
What is the facility's operation? ☒ Continuous ☐ Intermittent ☐ Batch			

Estimated percent of production/operation:	Jan-Mar: **25**	Apr-Jun: **25**	Jul-Sep: **25**	Oct-Dec: **25**
Requested operating times of facility:	**24** hours/day	**7** days/week	**4** weeks/month	**12** months/year

Will there be special or seasonal operating times other than shown above? This includes monthly- or seasonally-varying hours. **No**
If **YES**, please explain: **N/A**
List raw materials processed: **Chemicals, metal plates, bars, and tubing,**
List saleable item(s) produced: **There are no saleable items produced at this faciltiy.**

USE INSTRUCTIONS: For the forms on the following pages, please do not alter or delete the existing footnotes or page breaks. If additional footnotes are needed then add them to the end of the existing footnote list for a given table. Only update the rows and cells within tables as necessary for your project. Unused rows can be deleted from tables. If multiple scenarios will be represented then the Uncontrolled and Controlled Emission Tables, and other tables as needed, can be duplicated and adjusted to indicate the different scenarios.

Updated page rcvd January 7, 2025

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

General Operation Information (if any question does not pertain to your facility, type N/A on the line or in the box)

Permitting action being requested (please refer to the definitions in 20.11.40 NMAC or 20.11.41 NMAC):			
☐ New Permit	☒ Permit Modification Current Permit #: **1958-M1-1AR**	☐ Technical Permit Revision Current Permit #: **N/A**	☐ Administrative Permit Revision Current Permit #: **N/A**
☐ New Registration Certificate	☐ Modification Current Reg. #: **N/A**	☐ Technical Revision Current Reg. #: **N/A**	☐ Administrative Revision Current Reg. #: **N/A**
UTM coordinates of facility (Zone 13, NAD 83): **353322 m E, 3874379 m N**			
Facility type (*i.e.*, a description of your facility operations): **Manufacturing (graphite and fuel development)**			
Standard Industrial Classification (SIC Code #): **3443**		North American Industry Classification System (NAICS Code #): **332410**	
Is this facility currently operating in Bernalillo County? **Yes**		If **YES**, list date of original construction: **N/A** If **NO**, list date of planned startup: **N/A**	
Is the facility permanent? **Yes**		If **NO**, list dates for requested temporary operation: From **N/A** Through **N/A**	
Is the facility a portable stationary source? **No**		If **YES**, is the facility address listed above the main permitted location for this source? **N/A**	
Is the application for a physical or operational change, expansion, or reconstruction (*e.g.*, altering process, or adding, or replacing process or control equipment, etc.) to an existing facility? **Yes**			
Provide a description of the requested changes: **The addition of two (2) dust collectors, one (1) carbonizing furnace, one (1) TRISO development lab, one (1) engineering testing unit, building exhaust vents, and two (2) diesel pumps.**			
What is the facility's operation? ☒ Continuous ☐ Intermittent ☐ Batch			
Estimated percent of production/operation:	Jan-Mar: **25**	Apr-Jun: **25**	Jul-Sep: **25**	Oct-Dec: **25**
Requested operating times of facility:	**24** hours/day	**7** days/week	**4** weeks/month	**12** months/year
Will there be special or seasonal operating times other than shown above? This includes monthly- or seasonally-varying hours. **No**				
If **YES**, please explain: **N/A**				
List raw materials processed: **Chemicals, metal plates, bars, and tubing,**				
List saleable item(s) produced: **Reactor vessels**				

USE INSTRUCTIONS: For the forms on the following pages, please do not alter or delete the existing footnotes or page breaks. If additional footnotes are needed then add them to the end of the existing footnote list for a given table. Only update the rows and cells within tables as necessary for your project. Unused rows can be deleted from tables. If multiple scenarios will be represented then the Uncontrolled and Controlled Emission Tables, and other tables as needed, can be duplicated and adjusted to indicate the different scenarios.

Regulated Emission Sources Table

(*E.g.*, Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator-Haul Road-Storage Pile, etc.) Match the Units listed on this Table to the same numbered line if also listed on Emissions Tables & Stack Table.

Unit Number and Description[1]		Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[2]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[3]	Fuel Type
DUST-1	Dust Collector	Donaldson	DFE 4-32	TBD	TBD	TBD	N/A	18,000 acfm	N/A
DUST-2	Dust Collector	Donaldson	DFE 4-32	TBD	TBD	TBD	N/A	18,000 acfm	N/A
CARB-1	Carbonizing Furnace	Carbo Gerolite	GLO 120/09 automatic	TBD	TBD	TBD	N/A	130 L/hr	Propane
PDL	Pebble Development Laboratory	TBD	TBD	TBD	TBD	TBD	N/A	N/A	N/A
ETU	Engineering Testing Unit	TBD	TBD	TBD	TBD	TBD	N/A	96,000 acfm	N/A
Exhaust	Building Exhaust Vents	TBD	TBD	TBD	TBD	TBD	N/A	32,096 acfm	N/A
GEN-1	Emergency Diesel Fired generator	Caterpillar	CI8 (Tier 2 NSPS)	STH03184	2007	2008	11/2024	900 hp	Diesel
GEN-2	Emergency Diesel Fired generator	Cummins	*QST30-G5 NR2 / **DQFAB-1417292	*37252419/ **A120289258	12/2011	03/2015	11/2024	1,490 hp	Diesel
GEN-3	Emergency Diesel Fired generator	Cummins	*QST30-G5 NR2 / **DQFAB-1417292	*37263056/ **K140763964	09/2014	03/2015	11/2024	1,490 hp	Diesel
GEN-4	Emergency Diesel Fired generator	Cummins	*QST30-G5 NR2 / **DQFAA-9683879	*37252459/ **A120289259	12/2011	03/2015	11/2024	1,490 hp	Diesel
GEN-5	Emergency Diesel Fired generator	Cummins	*QST30-G5 NR2 / **DQFAA-9683881	*37252460/ **A120289257	12/2011	03/2015	11/2024	1,490 hp	Diesel
Pump-1	Diesel Fired Pump	Clarke	JW6H-UFAD80	TBD	TBD	TBD	N/A	422 hp	Diesel
Pump-2	Diesel Fired Pump	Eaton	XTJP-G07	TBD	TBD	TBD	N/A	3 hp	Diesel

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
2. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. If not, put N/A.
3. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) **Manufacturer's Data**
   Submit information for each unit as an attachment.

Emissions Control Equipment Table

Control Equipment Units listed on this Table should either match up to the same Unit number as listed on the Regulated Emission Sources, Controlled Emissions and Stack Parameters Tables (if the control equipment is integrated with the emission unit) or should have a distinct Control Equipment Unit Number and that number should then also be listed on the Stack Parameters Table.

Control Equipment Unit Number and Description		Controlling Emissions for Unit Number(s)	Manufacturer	Model # | Serial #	Date Installed	Controlled Pollutant(s)	% Control Efficiency[1]	Method Used to Estimate Efficiency	Rated Process Rate or Capacity or Flow
HEPA-1	HEPA Filter	DUST-2	TBD	TBD | TBD	TBD	PM_{10}, $PM_{2.5}$	99.97%	EPA Guidance	18,000 ACFM
HEPA-2	HEPA Filter	ETU	TBD	TBD | TBD	TBD	PM_{10}, $PM_{2.5}$	99.97%	EPA Guidance	96,000 ACFM
HEPA-3	HEPA Filter	Exhaust	TBD	TBD | TBD	TBD	PM_{10}, $PM_{2.5}$	99.97%	EPA Guidance	32,096 ACFM

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Equipment % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). **Manufacturer's Data**
   Submit information for each unit as an attachment.

Exempted Sources and Exempted Activities Table

See 20.11.41 NMAC for exemptions.

Unit Number and Description	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date[1]	Process Rate or Capacity (Hp, kW, Btu, ft^3, lbs, tons, yd^3, etc.)[2]	Fuel Type
THERE IS NO EXEMPT SOURCE OR ACTIVITES AT THIS FACILITY.								

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. To determine whether a unit has been modified, evaluate if changes have been made to the unit that impact emissions or that trigger modification as defined in 20.11.41.7(U) NMAC. Also, consider if any changes that were made alter the status from exempt to non-exempt. If not, put N/A.
2. Basis for Equipment Process Rate or Capacity (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.) **N/A**
   Submit information for each unit as an attachment.

Uncontrolled Emissions Table

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8760 hrs)

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Controlled Tables. List total HAP values per Emission Unit if overall HAP total for the facility ≥ 1 ton/yr.

Unit Number*	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Method(s) used for Determination of Emissions (AP-42, Material Balance, Field Tests, etc.)
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
DUST-1	-	-	-	-	-	-	-	-	3.93	17.23	1.16	5.07	-	-	AP-42 Table B.2.2
DUST-2	-	-	-	-	-	-	-	-	3.93	17.23	1.16	5.07	-	-	AP-42 Table B.2.2
CARB-1	0.45	1.96	0.26	1.13	0.034	0.15	6.87E-03	0.030	0.024	0.11	0.024	0.11	8.64E-06	3.78E-05	AP-42 Tables 1.4-3 & 1.5-1
PDL	-	-	7.35E-03	2.20E-05	0.044	2.20E-05	-	-	-	-	-	-	-	-	Field Tests
ETU	-	-	-	-	-	-	-	-	20.98	91.90	6.17	27.03	2.00E-03	8.77E-03	AP-42 Table B.2.2
Exhaust	-	-	-	-	-	-	-	-	19.22	84.20	5.65	24.76	-	-	AP-42 Table B.2.2
GEN-1	9.00	39.40	5.18	22.68	0.47	2.07	1.71	7.48	0.30	0.074	0.30	0.074	0.038	0.16	EPA NSPS Tier 2 emission factors
GEN-2	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	EPA NSPS Tier 2 emission factors
GEN-3	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	EPA NSPS Tier 2 emission factors
GEN-4	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	EPA NSPS Tier 2 emission factors
GEN-5	14.89	65.23	8.57	37.55	0.78	3.43	2.24	9.81	0.49	0.12	0.49	0.12	0.049	0.22	EPA NSPS Tier 2 emission factors
Pump-1	0.28	1.22	2.43	10.64	0.13	0.58	0.079	0.35	0.014	0.061	0.014	0.061	1.04E-03	4.55E-03	EPA NSPS Tier 4 emissin

Unit Number*	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Method(s) used for Determination of Emissions (AP-42, Material Balance, Field Tests, etc.)
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	
															factors / AP-42 Section 3.3
Pump-2	7.23	31.67	8.12	35.56	0.38	1.67	9.93E-03	0.044	0.41	1.78	0.41	1.78	1.30E-04	5.69E-04	EPA NSPS Tier 4 emissin factors / AP-42 Section 3.3
Totals of Uncontrolled Emissions	**76.52**	**335.17**	**50.28**	**220.21**	**4.20**	**18.20**	**10.77**	**47.16**	**50.77**	**213.07**	**16.84**	**64.44**	**0.24**	**1.04**	

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

*A permit is required and this application along with the additional checklist information requested on the Permit Application checklist must be provided if:

(1) any one of these process units or combination of units, has an uncontrolled emission rate greater than or equal to (≥) 10 lbs/hr or 25 tons/yr for any of the above pollutants, excluding HAPs, based on 8,760 hours of operation; or

(2) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 2 tons/yr for any single HAP or ≥ 5 tons/yr for any combination of HAPs based on 8,760 hours of operation; or

(3) any one of these process units or combination of units, has an uncontrolled emission rate ≥ 5 tons/yr for lead (Pb) or any combination of lead and its compounds based on 8,760 hours of operation; or

(4) any one of the process units or combination of units is subject to an Air Board or federal emission limit or standard.

* If all of these process units, individually and in combination, have an uncontrolled emission rate less than (<) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8,760 hours of operation), but > 1 ton/yr for any of the above pollutants, then a source registration is required. A Registration is required, at minimum, for any amount of HAP emissions. Please complete the remainder of this form.

Controlled Emissions Table

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

Regulated Emission Units listed on this Table should match up to the same numbered line and Unit as listed on the Regulated Emissions and Uncontrolled Tables. List total HAP values per Emission Unit if overall HAP total for the facility ≥ 1 ton/yr.

Unit Number	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Control Method	% Efficiency[1]
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
DUST-1	-	-	-	-	-	-	-	-	0.16	0.69	0.046	0.20	-	-	Manufacturer Specification	N/A
DUST-2	-	-	-	-	-	-	-	-	4.72E-05	2.07E-04	1.39E-05	6.08E-05	-	-	HEPA Filter	99.97 %
CARB-1	0.45	1.96	0.26	1.13	0.034	0.15	6.87E-03	0.030	0.024	0.11	0.024	0.11	8.64E-06	3.78E-05	N/A	N/A
PDL	-	-	7.35E-03	2.20E-05	0.044	2.20E-05	-	-	-	-	-	-	4.41	0.71	N/A	N/A
ETU	-	-	-	-	-	-	-	-	6.29E-03	0.028	1.85E-03	8.11E-03	2.00E-03	8.77E-03	HEPA Filter	99.97 %
Exhaust	-	-	-	-	-	-	-	-	5.77E-03	0.025	1.70E-03	7.43E-03	-	-	HEPA Filter	99.97 %
GEN-1	9.00	2.25	5.18	1.29	0.47	0.12	1.71	0.43	0.30	0.074	0.30	0.074	0.038	9.38E-03	Hours of Operation	N/A
GEN-2	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	Hours of Operation	N/A
GEN-3	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	Hours of Operation	N/A
GEN-4	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	Hours of Operation	N/A
GEN-5	14.89	3.72	8.57	2.14	0.78	0.20	2.24	0.56	0.49	0.12	0.49	0.12	0.049	0.012	Hours of Operation	N/A
Pump-1	0.28	0.069	2.43	0.61	0.13	0.033	0.079	0.020	0.014	3.47E-03	0.014	0.061	1.04E-03	2.60E-04	None	N/A

Unit Number	Nitrogen Oxides (NO_X)		Carbon Monoxide (CO)		Nonmethane Hydrocarbons/Volatile Organic Compounds (NMHC/VOCs)		Sulfur Dioxide (SO_2)		Particulate Matter ≤ 10 Microns (PM_{10})		Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)		Hazardous Air Pollutants (HAPs)		Control Method	% Efficiency[1]
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr		
Pump-2	7.23	1.81	8.12	2.03	0.38	0.095	9.93E-03	2.48E-03	0.41	0.10	0.41	1.78	1.30E-04	3.25E-05	None	N/A
Totals of Controlled Emissions	**76.52**	**20.97**	**50.28**	**13.63**	**4.20**	**1.18**	**10.77**	**2.72**	**2.87**	**1.52**	**2.75**	**2.73**	**4.65**	**0.77**		

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). **Manufacturer's Data**
   Submit information for each unit as an attachment.

Hazardous Air Pollutants (HAPs) Emissions Table

Report the Potential Emission Rate for each HAP from each source on the Regulated Emission Sources Table that emits a given HAP. Report individual HAPs with ≥ 1 ton/yr total emissions for the facility on this table. Otherwise, report total HAP emissions for each source that emits HAPs and report individual HAPs in the accompanying application package in association with emission calculations. If this application is for a Registration solely due to HAP emissions, report the largest HAP emissions on this table and the rest, if any, in the accompanying application package.

Unit Number	Total HAPs		Formaldehyde													
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
DUST-1	-	-	-	-												
DUST-2	-	-	-	-												
CARB-1	8.64E-06	3.78E-05	3.44E-07	1.51E-06												
PDL	4.41	0.71	-	-												
ETU	2.00E-03	8.77E-03	-	-												
Exhaust	-	-	-	-												
GEN-1	0.038	9.38E-03	6.95E-03	1.74E-03												
GEN-2	0.049	0.012	9.12E-03	2.28E-03												
GEN-3	0.049	0.012	9.12E-03	2.28E-03												
GEN-4	0.049	0.012	9.12E-03	2.28E-03												
GEN-5	0.049	0.012	9.12E-03	2.28E-03												
Pump-1	1.04E-03	2.60E-04	3.23E-04	8.08E-05												
Pump-2	1.30E-04	3.25E-05	4.04E-05	1.01E-05												
Totals of HAPs for all units:	**4.65**	**0.77**	**0.044**	**0.011**												

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Use Instructions: Copy and paste the HAPs table here if need to list more individual HAPs.

Purchased Hazardous Air Pollutant Table*

Product Categories (Coatings, Solvents, Thinners, etc.)	Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service (CAS) Number of HAP or VHAP from Representative As Purchased Product	HAP or VHAP Concentration of Representative As Purchased Product (pounds/gallon, or %)	Concentration Determination (CPDS, SDS, etc.)[1]	Total Product Purchases For Category	(-)	Quantity of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
THERE ARE NO PURCHASED HAZARDOUS AIR POLLUTANTS AT THIS FACILITY.									
TOTALS					**lb/yr** **gal/yr**	**(-)**	**lb/yr** **gal/yr**	**(=)**	**lb/yr** **gal/yr**

NOTE: To add extra rows in Word, click anywhere in the second-to-last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

NOTE: Product purchases, recovery/disposal and usage should be converted to the units listed in this table. If units cannot be converted please contact the Air Quality Program prior to making changes to this table.

1. Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. CPDS = Certified Product Data Sheet; SDS = Safety Data Sheet

*** A Registration is required, at minimum, for any amount of HAP or VHAP emission.**
Emissions from purchased HAP usage should be accounted for on previous tables as appropriate.
A permit may be required for these emissions if the source meets the requirements of 20.11.41 NMAC.

Material and Fuel Storage Table

(*E.g.*, Tanks, barrels, silos, stockpiles, etc.)

Storage Equipment	Product Stored	Capacity (bbls, tons, gals, acres, etc.)	Above or Below Ground	Construction (Welded, riveted) & Color	Installation Date	Loading Rate[1]	Offloading Rate[1]	True Vapor Pressure	Control Method	Seal Type	% Eff.[2]
THERE IS NO MATERIAL AND FUEL STORAGE UNITS AT THIS FACILITY.											

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

1. Basis for Loading/Offloading Rate (*e.g.*, Manufacturer's Data, Field Observation/Test, etc.). **N/A**
   Submit information for each unit as an attachment.
2. Basis for Control Method % Efficiency (*e.g.*, Manufacturer's Data, Field Observation/Test, AP-42, etc.). **N/A**
   Submit information for each unit as an attachment.

Stack Parameters Table

If any equipment from the Regulated Emission Sources Table is also listed in this Stack Table, use the same numbered line for the emission unit on both tables to show the association between the Process Equipment and its stack.

Unit Number and Description		Pollutant (CO, NOx, PM_{10}, etc.)	UTM Easting (m)	UTM Northing (m)	Stack Height (ft)	Stack Exit Temp. (°F)	Stack Velocity (fps)	Stack Flow Rate (acfm)	Stack Inside Diameter (ft)	Stack Type
DUST-1	Dust Collector	PM_{10}, $PM_{2.5}$	353017	3874772	38.00	Ambient	124.73	18000.00	1.75	Vertical
CARB-1	Carbonizing Furnace/Pebble Development Lab	NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$	353019	3874724	38.00	300.00	127.32	6000.00	1.00	Vertical
ETU-1	Engineering Test Unit	PM_{10}, $PM_{2.5}$	352943	3874713	20.00	100.00	22.45	31999.80	5.50	Vertical
ETU-2	Engineering Test Unit	PM_{10}, $PM_{2.5}$	352944	3874717	20.00	100.00	22.45	31999.80	5.50	Vertical
ETU-3	Engineering Test Unit	PM_{10}, $PM_{2.5}$	352944	3874720	20.00	100.00	22.45	31999.80	5.50	Vertical
EX-1	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	352989	3874713	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-2	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	352991	3874713	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-3	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	352974	3874722	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-4	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	353021	3874837	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-5	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	353022	3874842	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-6	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	353014	3874868	38.00	Ambient	108.98	32096.40	2.50	Vertical
EX-7	Building Exhaust Vent	PM_{10}, $PM_{2.5}$	353026	3874868	38.00	Ambient	108.98	32096.40	2.50	Vertical

NOTE: To add extra rows in Word, click anywhere in the last row. A plus (+) sign should appear on the bottom right corner of the row. Click the plus (+) sign to add a row. Repeat as needed.

Certification

NOTICE REGARDING SCOPE OF A PERMIT: The Environmental Health Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City of Albuquerque Planning Department or Bernalillo County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City of Albuquerque Planning Department website at https://www.cabq.gov/planning and the Bernalillo County Department of Planning and Development Services website at https://www.bernco.gov/planning.

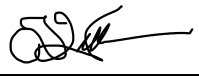
NOTICE REGARDING ACCURACY OF INFORMATION AND DATA SUBMITTED: Any misrepresentation of a material fact in this application and its attachments is cause for denial of a permit or revocation of part or all of the resulting registration or permit, and revocation of a permit for cause may limit the permitee's ability to obtain any subsequent air quality permit for ten (10) years. Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained under the Air Quality Control Act, NMSA 1978 §§ 74-2-1 to 74-2-17, is guilty of a misdemeanor and shall, upon conviction, be punished by a fine of not more than ten thousand dollars ($10,000) per day per violation or by imprisonment for not more than twelve months, or by both.

I, the undersigned, hereby certify that I have knowledge of the information and data represented and submitted in this application and that the same is true and accurate, including the information and date in any and all attachments, including without limitation associated forms, materials, drawings, specifications, and other data. I also certify that the information represented gives a true and complete portrayal of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I understand that there may be significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I also understand that the person who has applied for or has been issued an air quality permit by the Department is an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC. Further, I certify that I am qualified and authorized to file this application, to certify the truth and accuracy of the information herein, and bind the source. Moreover, I covenant and agree to comply with any requests by the Department for additional information necessary for the Department to evaluate or make a final decision regarding the application.

Signed this 11 day of December, 20 24

Terrence Williams
Print Name

Director, EHS
Print Title


Signature

Role: ☐ Owner ☐ Operator

☒ Other Authorized Representative

City of Albuquerque
Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

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

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

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

2. mail it to Albuquerque Environmental Health Department, Air Quality Program, Permitting Division, P.O. Box 1293, Albuquerque, NM 87103.

3. online fee payments are now accepted as well. Application must be submitted first, then Department will provide invoice for online payment.

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

City of Albuquerque
Environmental Health Department
Air Quality Program

Permit Application Review Fee Checklist Effective January 1, 2024 – December 31, 2024

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

I. COMPANY INFORMATION:

Company Name	Kairos Power, LLC	
Company Address	707 W. Tower Ave, Ste. A, Alameda, CA 95401	
Facility Name	Kairos Power Southwest	
Facility Address	5201 Hawking Dr. SE, Albuquerque, NM 87106	
Contact Person	Terrence Williams	
Contact Person Phone Number	(510) 775-1822	
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?	**Yes** ☒	**No** ☐
If yes, what is the permit number associated with this modification?	**Permit #** 1958-M1-1AR	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)	**Yes** ☐	**No** ☒

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

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

Check All That Apply	Stationary Sources	Review Fee	Program Element
	Air Quality Notifications		
☐	AQN New Application	$680.00	2801
☐	AQN Technical Amendment	$371.00	2802
☐	AQN Transfer of a Prior Authorization	$371.00	2803
☒	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)		
☐	Source Registration required by 20.11.40 NMAC	$693.00	2401
☐	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,385.00	2301
☒	*Not Applicable*	*See Sections Below*	
	Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$1,039.00	2302
☐	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$2,078.00	2303
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$4,156.00	2304
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$6,324.00	2305
☐	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$8,312.00	2306
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$10,390.00	2307
☒	*Not Applicable*	*See Sections Below*	

Federal Program Review Fees for each subpart (In addition to the Stationary Source Application Review Fees above)			
☐	40 CFR 60 – "New Source Performance Standards" (NSPS)	$1,385.00	2308
☐	40 CFR 61 – "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,385.00	2309
☐	40 CFR 63 – (NESHAPs) Promulgated Standards	$1,385.00	2310
☐	40 CFR 63 – (NESHAPs) Case-by-Case MACT Review	$13,854.00	2311
☐	20.11.61 NMAC – Prevention of Significant Deterioration (PSD) Permit	$6,927.00	2312
☐	20.11.60 NMAC – Non-Attainment Area Permit	$6,927.00	2313
☒	*Not Applicable*	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

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

Check All That Apply	Modifications	Review Fee	Program Element
Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)			
☐	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$1,385	2321
☒	*Not Applicable*	*See Sections Below*	
Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)			
☐	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$1,039.00	2322
☒	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$2,078.00	2323
☐	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$4,156.00	2324
☐	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$6,234.00	2325
☐	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$8,312.00	2326
☐	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$10,390.00	2327
☐	*Not Applicable*	*See Sections Below*	
Major Modifications Review Fees (In addition to the Modification Application Review Fees above)			
☐	20.11.60 NMAC – Permitting in Non-Attainment Areas	$6,927.00	2333
☐	20.11.61 NMAC – Prevention of Significant Deterioration	$6,927.00	2334
☒	*Not Applicable*	*Not Applicable*	
Federal Program Review Fees for each subpart (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)			
☒	40 CFR 60 – "New Source Performance Standards" (NSPS)	$1,385.00	2328
☐	40 CFR 61 – "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$1,385.00	2329
☒	40 CFR 63 – (NESHAPs) Promulgated Standards	$1,385.00	2330
☐	40 CFR 63 – (NESHAPs) Case-by-Case MACT Review	$13,854.00	2331
☐	20.11.61 NMAC – Prevention of Significant Deterioration (PSD) Permit	$6,927.00	2332
☐	20.11.60 NMAC – Non-Attainment Area Permit	$6,927.00	2333
☐	*Not Applicable*	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

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

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

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

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

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

VI. Please submit payment in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$0.00
Section III Total	$4,848.00
Section IV Total	$0.00
Section V Total	$0.00
Total Application Review Fee	**$4,848.00**

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

Signed this 11 day of December , 20 24

Terrence Williams
Print Name

Director, EHS
Print Title

Signature

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

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

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

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Application Checklist

This checklist must be returned with the application

Any person seeking a new air quality permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

The Department will rule an application administratively incomplete if it is missing or has incorrect information. The Department may require additional information that is necessary to make a thorough review of an application, including but not limited to technical clarifications, emission calculations, emission factor usage, additional application review fees if any are required by 20.11.2 NMAC, and new or additional air dispersion modeling.

If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The following are the minimum elements that shall be included in the permit application before the Department can determine whether an application is administratively complete and ready for technical review. It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.

At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes but is not limited to relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING PERMIT APPEALS: A person who has applied for or has been issued an air quality permit by the Department shall be an obligatory party to a permit appeal filed pursuant to 20.11.81 NMAC.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

The Applicant shall:

20.11.41.13(A) NMAC – Pre-Application Requirements:

Item	Completed	N/A[1]	Waived[2]
(1) Request a pre-application meeting with the Department using the pre-application meeting request form. Include a copy of the request form submitted to the Department.	☒	☐	☐
(2) Attend the pre-application meeting. Date of pre-application meeting: **January 10, 2024**	☒	☐	☐
Pre-application meeting agenda and public notice sign checklists included with application?	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(B) NMAC – Applicant's Public Notice Requirements:

Item	Included in Application	N/A[1]	Waived[2]
(1) Provide public notice in accordance with the regulation, including by certified mail or electronic copy to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.	☒	☐	☐
• Contact list of representative(s) of recognized neighborhood associations and recognized coalitions cannot be more than three months old from the application submittal date. • Include contact list provided by Department in application submittal.	☒	☐	☐
• Provide notice using the Notice of Intent to Construct form and Applicant Notice Cover Letter.	☒	☐	☐
(2) In accordance with the regulation, post and maintain in a visible location a weather proof sign provided by the Department. Include pictures in application.	☒	☐	☐
Documentary proof of all public notice requirements listed above and required by 20.11.41.13(E)(15) included with application?	☒	☐	☐

1. *Not Applicable; For emergency permits, the public notice requirements in 20.11.41.24 NMAC shall apply instead.*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*

20.11.41.13(D) NMAC

Item	Included in Application
A person who is seeking a construction permit pursuant to 20.11.41 NMAC shall complete a permit application and file one complete original and one duplicate copy with the Department.	☒
• A high-quality electronic duplicate copy is required by the Department to speed up review and allow for the Department public notice to be posted online. The electronic copy must be an exact duplicate of the hardcopy original, including pages with signatures such as the application certification page. Note: Do not include financial information, such as a copy of a check, in the electronic PDF.	☒
The electronic submittal on thumb drive, unless alternate method is allowed by the Department, must also include modeling files, if applicable, and emission calculations file(s) in Microsoft Excel-compatible format.	☒

The Permit Application shall include:

20.11.41.13(E) NMAC – Application Contents

Item	Included in Application	N/A[1]	Waived[2]
(1) A complete permit application on the most recent form provided by the Department.	☒	☐	☐
(2) The application form includes:			
a. The applicant's name, street and post office address, and contact information;	☒	☐	☐
b. The facility owner/ operator's name, street address and mailing address, if different from the applicant;	☒	☐	☐
c. The consultant's name and contact information, if applicable;	☒	☐	☐
d. All information requested on the application form is included (*i.e.*, the form is complete).	☒	☐	☐
(3) The date the application was submitted to the Department.	☒	☐	☐
(4) Sufficient attachments for the following:			
a. Ambient impact analysis using an atmospheric dispersion model approved by the U.S. Environmental Protection Agency, and the Department to demonstrate compliance with the applicable National Ambient Air Quality Standards (NAAQS). *See* 20.11.1 NMAC. If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.	☒	☐	☐
b. The air dispersion model has been executed pursuant to a protocol that was approved in advance by the Department.	☒	☐	☐
c. Air dispersion modeling approved (or 2nd denied) protocol date: **May 10, 2024**	☒	☐	☐
d. Basis or source for each emission rate (including manufacturer's specification sheets, AP-42 section sheets, test data, or corresponding supporting documentation for any other source used).	☒	☐	☐
e. All calculations used to estimate potential emission rates and controlled/proposed emissions.	☒	☐	☐
f. Basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design, drawing, test report and factors which affect the normal operation.	☒	☐	☐
g. Fuel data for each existing and/or proposed piece of fuel burning equipment.	☒	☐	☐
h. Anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.	☒	☐	☐
i. Stack and exhaust gas parameters for all existing and proposed emission stacks.	☒	☐	☐
(5) An operational and maintenance strategy detailing:	☒	☐	☐
a. the steps the applicant will take if a malfunction occurs that may cause emission of a regulated air contaminant to exceed a limit that is included in the permit;	☒	☐	☐
b. the nature of emissions during routine startup or shutdown of the source and the source's air pollution control equipment; and	☒	☐	☐
c. the steps the applicant will take to minimize emissions during routine startup or shutdown.	☒	☐	☐
(6) A map, such as a 7.5'-topographic quadrangle map published by the U.S. Geological Survey or a map of equivalent or greater scale, detail, and precision, including a City or County zone atlas map that shows the proposed location of each process equipment unit involved in the proposed construction, modification, or operation of the source, as applicable.	☒	☐	☐

Item	Included in Application	N/A[1]	Waived[2]
(7) An aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the Department in writing.	☒	☐	☐
(8) A complete description of all sources of regulated air contaminants and a process flow diagram depicting the process equipment unit or units at the facility, both existing and proposed, that are proposed to be involved in routine operations and from which regulated air contaminant emissions are expected to be emitted.	☒	☐	☐
(9) A full description of air pollution control equipment, including all calculations and the basis for all control efficiencies presented, manufacturer's specifications sheets, and site layout and assembly drawings; UTM (universal transverse mercator) coordinates shall be used to identify the location of each emission unit.	☒	☐	☐
(10) A description of the equipment or methods proposed by the applicant to be used for emission measurement.	☒	☐	☐
(11) The maximum and normal operating time schedules of the source after completion of construction or modification, as applicable.	☒	☐	☐
(12) Any other relevant information as the Department may reasonably require, including without limitation:	☒	☐	☐
a. Provide an applicability determination for all potentially applicable federal regulations.	☒	☐	☐
b. Applicants shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation includes: (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the property is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the property is not subject to City or County zoning jurisdiction.[3] A zone atlas map shall not be sufficient.	☒	☐	☐
c. Compliance History Disclosure Form[4]	☒	☐	☐
(13) The signature of the applicant, operator, owner or an authorized representative, certifying to the accuracy of all information as represented in the application and attachments, if any.	☒	☐	☐
(14) A check or money order for the appropriate application fee or fees required by 20.11.2 NMAC, *Fees*. (Online fee payments are now accepted as well. Application must be submitted first, then Department will provide invoice for online payment.)	☒	☐	☐

1. *Not Applicable*
2. *It is not necessary to include an element if the Department has issued a written waiver regarding the element and the waiver accompanies the application. However, the Department shall not waive any federal requirements.*
3. *Applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.*
4. *Required for applications filed pursuant to the following regulations: Construction Permits (20.11.41 NMAC); Operating Permits (20.11.42 NMAC); Nonattainment Areas (20.11.60 NMAC); Prevention of Significant Deterioration (20.11.61 NMAC); and Acid Rain (20.11.62 NMAC); except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC, and this Form shall only be required for administrative permit revision (20.11.41.28(A) NMAC) and administrative permit amendments (20.11.42.12(E)(1) NMAC) when the action requested is a transfer of ownership. Air Quality Program staff can answer basic questions about the Compliance History Disclosure Form but will not provide specific advice about which boxes to check or whether information must be disclosed. The decision about how to answer a question and whether there is information to disclose is the responsibility of applicants/permittees.*

City of Albuquerque
Environmental Health Department
Air Quality Program

Air Quality
Compliance History Disclosure Form

The Albuquerque-Bernalillo County Joint Air Quality Program ("Program") administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County") on behalf of the City Environmental Health Department, including the New Mexico Air Quality Control Act ("AQCA"), NMSA 1978, Sections 74-2-1 to -17. In accordance with Sections 74-2-7(P) and (S) of the AQCA, the Program may deny any permit application or revoke any permit issued pursuant to the AQCA if, within ten years immediately preceding the date of submission of the permit application, the applicant or permittee meets any one of the criteria outlined in the AQCA. The Program requires applicants to file this Compliance History Disclosure Form in order for the Program to deem an air permit application administratively complete, or issue an air permit for those permits without an initial administrative completeness determination process. Additionally, an existing permit holder (permits issued prior to the Effective Date of this Form) shall provide this Compliance History Disclosure Form to the Program upon the Program's request. Note: Program Staff can answer basic questions about this Compliance History Disclosure Form but cannot provide specific guidance or legal advice.

Instructions

1. Applications filed pursuant to the following regulations shall include this Compliance History Disclosure Form, in accordance with Section 74-2-7(S) of the AQCA: *Construction Permits* (20.11.41 NMAC); *Operating Permits* (20.11.42 NMAC); *Nonattainment Areas* (20.11.60 NMAC); *Prevention of Significant Deterioration* (20.11.61 NMAC); *Acid Rain* (20.11.62 NMAC); and *Fugitive Dust* (20.11.20 NMAC) except this Form shall not be required for asbestos notifications under 20.11.20.22 NMAC.
2. This Compliance History Disclosure Form is not site specific: responses shall be based on the applicant/permittee as an entity and not be limited to the application, site, facility or source.
3. The permittee identified on this Compliance History Disclosure Form shall match the permittee in the existing permit or new application. If the information in an existing permit needs to be changed, please contact the Program about revisions and ownership transfers.
4. Answer every question completely and truthfully, and do not leave any blank spaces. If there is nothing to disclose in answer to a particular question, check the box labeled "No" except for Question 5b. Failure to provide any of the information requested in this Compliance History Disclosure Form may constitute grounds for an incompleteness determination, application denial, or permit revocation.
5. Be especially careful not to leave out information in a way that might create an impression that you are trying to hide it. Omitting information, even unintentionally, may result in application denial or permit revocation.
6. For any required explanations, be sure to identify the question to which the explanation is responsive. If you submit any document in connection with your answer to any question, refer to it as, "Exhibit No.__", and attach it after the explanation(s) at the end of the Compliance History Disclosure Form, consecutively numbering each additional page at the top right corner.
7. The Program may require additional information to make a thorough review of an application. At all times before the Program has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Program. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Program's review and decision. While the Program is processing an application, regardless of whether the Program has determined the application is administratively complete, if the Program determines that additional information is necessary to evaluate or make a final decision regarding the application, the Program may request additional information and the applicant shall provide the requested additional information.
8. Supplementary information required by the Program may include responses to public comment received by the Program during the application review process.
9. Any fees submitted for processing an application that has been denied will not be refunded. If the Program denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

COMPLIANCE HISTORY		
A. Applicant/Permittee Name: Kairos Power LLC		*Check Applicable Box*: ☒ Applicant ☐ Permittee
B. Time Period of Compliance Reporting (10 Years): August 1, 2016 to May 31, 2024 *Instructions: For applicants, answer the following questions with information from within the 10 years preceding the current application. For existing permit holders requested to submit this form by the Program outside of an application, answer the following questions with information from within the 10 years preceding the Program's issuance of each permit.*		
C. Questions		
1	Knowingly misrepresented a material fact in an application for a permit?	☐ Yes ☒ No
2	Refused to disclose information required by the provisions of the New Mexico Air Quality Control Act?	☐ Yes ☒ No
3	Been convicted in any court of any state or the United States of a felony related to environmental crime?	☐ Yes ☒ No
4	Been convicted in any court of any state or the United States of a crime defined by state or federal statute as involving or being in restraint of trade, price fixing, bribery, or fraud?	☐ Yes ☒ No
5a	Constructed or operated any facility for which a permit was sought, including the current application, without the required air quality permit(s) under 20.11.41 NMAC, 20.11.42 NMAC, 20.11.60 NMAC, 20.11.61 NMAC, or 20.11.62 NMAC?	☒ Yes ☐ No
5b	If "No" to question 5a, mark N/A and go to question 6. If "Yes" to question 5a, state whether each facility that was constructed or operated without the required air quality permit met at least one of the following exceptions: i. The unpermitted facility was discovered after acquisition during a timely environmental audit that was authorized by the Program or the New Mexico Environment Department; or ii. The operator of the facility, using good engineering practices and established approved calculation methodologies, estimated that the facility's emissions would not require an air permit, **and** the operator applied for an air permit within 30 calendar days of discovering that an air permit was required for the facility.	☒ Yes ☐ No ☐ N/A
6	Had any permit revoked or permanently suspended for cause under the environmental laws of any state or the United States?	☐ Yes ☒ No
7	For each "yes" answer, or "no" to 5b, please attach an explanation and supporting documentation.	

I, the undersigned, hereby certify under penalty of law that this Compliance History Disclosure Form (Form) and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. I have knowledge of the information in this Form and it is, to the best of my knowledge and belief, true, accurate, and complete. I understand that there are significant penalties for submitting false information, including denial of the application or revocation of a permit, as well as fines and imprisonment for knowing violations. If I filed an application, I covenant and agree to promptly supplement and correct information in this Form until the Program makes a final decision regarding the application. Further, I certify that I am qualified and authorized to file this Form, to certify to the truth and accuracy of the information herein, and bind the permittee and source.

Signed on May 29, 2024

Terrence WIlliams
Print Name


Signature

Director, EHS
Print Title

Kairos Power LLC
Company Name

Kairos Power

707 West Tower Avenue, Suite A
Alameda, CA 94501
510.808.5265

May 29, 2024, Year

City of Albuquerque
Environmental Health Department
Air Quality Program
P.O. Box 1293
Albuquerque NM 87103

To whom it may concern,

Kairos Power purchased the facility located at 5201 Hawing Drive SE, Albuquerque, NM 87106 ("Facility") in 2020. At that time, the Facility had an air permit for seven point sources. After the purchase, Kairos Power began the process of transferring the Facility's air permit from the prior owner to itself. This air permit was transferred to Kairos Power on February 6, 2024. In the intervening period, Kairos Power added six low-emitting point sources to the Facility. Kairos Power is now in the process of amending its air permit to include these additional sources, having conducted a pre-application meeting with the City's Environmental Health Department in the Fall of 2023 and having submitted a modeling protocol and data to the City in the Spring of 2024. Kairos Power looks forward to addressing any questions from, or concerns by, the City during the permit amendment process and to ensuring that all future construction and operation at the Facility are in compliance with permit requirements.

Sincerely,

Terrence Williams
Director, EHS

APPENDIX B. PRE-APPLICATION MEETING

The following pages contain:

- Pre-Permit Meeting Request Form (Updated November 2023)
- Pre-Permit Meeting Agenda & Public Notice Sign Checklists (Updated November 2023)

Pre-Permit Application Meeting Request Form

Air Quality Program- Environmental Health Department

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

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

Name:	**Kairos Power Southwest Facility**
Company/Organization:	Kairos Power 5201 Hawking Dr SE Albuquerque, NM 87106 Permit #: 1958-M1
Point of Contact: **(phone number and email):** **Preferred form of contact (circle one):** Phone E-mail ☑	Terrence Williams, Senior EH&S Manager Phone: (510) 808-5265 x1238 Email: williams@kairospower.com Michael Celente, Managing Consultant Phone: (505) 266-6611 Email: mcelente@trinityconsultants.com
Preferred meeting date/times:	As soon as practicable for the department.
Description of Project:	Kairos Power Southwest (Kairos) currently operates under air quality construction permit #1958-M1. This permit was previously issued to Nova Corporation and has been transferred to Kairos. Since acquisition of the facility and permit, Kairos plans to make modifications to the facility including the addition of dust collectors, graphite machining operations, and other sources of emissions. Kairos plans to update the current permit to reflect future operations.

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Pre-Permit Application Meeting Agenda Checklist & Public Notice Sign Guidelines Checklist

This entire document, including both completed checklists, must be included as part of the application package.

Any person seeking a new permit, a permit modification, or an emergency permit under 20.11.41 NMAC (Construction Permits) shall do so by filing a written application with the Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Prior to submitting an application, per 20.11.41.13(A) NMAC, the applicant (or their consultant) shall contact the Department in writing and submit a Pre-Permit Application Meeting Request Form to request a pre-application meeting. The Pre-Permit Application Meeting Request Form is available at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms. The purpose of the pre-application meeting is for the Department to provide the applicant with information regarding the contents of the application and the application process.

This pre-application meeting agenda checklist is provided to aid the Department and applicant in ensuring that in the pre-permit application meeting all information regarding the contents of the application and the application process are communicated to the applicant. This is because applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

Also included in this document is the Public Notice Sign Guidelines Checklist, which contains requirements for how the applicant must display the required weather-proof sign.

The applicant should fill out and have this agenda checklist available at the pre-application meeting to be sure all items are covered. Check the boxes to acknowledge that each item from the agenda was discussed and that requirements for the weather-proof sign were followed.

Pre-Permit Application Meeting Agenda Checklist

Applicant Company Name: **Kairos Power, LLC**
Facility Name: **Kairos Power Southwest**

☒ Fill out and submit a Pre-Permit Application Meeting Request form
Available online at https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms/air-quality-application-forms

I. ☒ Discuss Project:
   a. Facility Location
   b. Facility Description
   c. Main Processes
   d. Equipment
   e. Proposed Schedule

II. ☒ Discuss the requirement for a zoning certification or verifications for new permits and permit modifications. The Zoning Requirement Cover Page form is a required component of this part of the submittal:
   a. For projects on property subject to City or County zoning laws (*i.e.*, **not** located on federal land, **not** located on State of New Mexico land, **not** located on Tribal land), a zoning certification from the appropriate planning department is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   b. If the project's property is not subject to City or County zoning jurisdiction, a zoning verification from both planning departments is required.
      i. City Planning Form: https://www.cabq.gov/planning/code-enforcement-zoning
      ii. County Planning Form: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/
   c. The zoning certification or verifications **must** be obtained from the appropriate Planning Department, either City of Albuquerque or Bernalillo County. For more information, please visit the City's Planning Department website at https://www.cabq.gov/planning or Bernalillo County's Planning Department website at the https://www.bernco.gov/planning/.

III. ☒ Discuss the requirement for a Compliance History Disclosure Form as of Nov. 6, 2023 for permit application submittals except for Administrative Revisions that are not transfers of ownership.

IV. ☒ If permit modification or revision, review current permit:
   a. Review Process Equipment Table and Emissions Table and discuss changes
   b. Request information about the replacement or new equipment (for example, if it is an engine, we need to know if it is new, what year, fuel type, etc…) to give them an idea of the changes that will be needed
   c. Discuss possible changes in permit conditions

V. ☒ Air Dispersion modeling process, procedures and options:
   a. When modeling is required and possibility of waivers
   b. Protocol process, purpose, and time frame
   c. Preliminary review, purpose, and time frame
   d. Full review and time frame
   e. Peer reviews
   f. Assumptions in the modeling become permit conditions
   g. NED data should be used instead of DEM data for assigning elevations to receptors, sources, buildings, etc.

VI. ☒ Applicant's public notice requirements

a. During the same month application package will be submitted, ask Department for memo of neighborhood associations/coalitions within ½ mile of facility
b. Fill out and send Notice of Intent to Construct form as attachment, with Applicant Notice Cover Letter as email body, to neighborhood associations/coalitions listed in memo: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
c. Post and maintain a weather-proof sign. Signs are available in the downtown Program office. The Public Notice Sign Guidelines Checklist can be found on the next page of this document.

VII. ☒ Regulatory timelines

a. 30 days to rule application complete
b. 90 days after ruled complete for permitting decision
c. 30-day public comment period after application deemed complete
d. If public interest in application:
    i. 30-day review of technical analysis
    ii. 90-day extension for permitting decision
e. Request for Public Information Hearing - 90-day extension for permitting decision
f. Complex technical issues in application - 90-day extension for permitting decision
g. If application ruled incomplete it stops timeline and restarts at beginning with updated submittal

VIII. ☒ Department Policies

a. One original hard copy must be submitted along with a duplicate copy. The duplicate copy should be a high-quality electronic duplicate submitted on thumb drive as one complete PDF with all application contents found in the hardcopy, including pages with signatures. However, do not include financial information, such as a copy of a check, in the electronic PDF. The electronic submittal should also include emission calculations Excel-compatible file(s) and modeling files, if applicable.
b. Applications will be ruled incomplete if any parts from Permit Application Checklist are missing
c. Review fees paid in full are part of the application package (Except as noted above)
d. Discuss payment format (by check, credit card or online)
e. Use the most recent Permit Application Checklist, found under Part 41 Implementation on this page: https://www.cabq.gov/airquality/air-quality-permits/air-quality-application-forms
f. After three tries, permit application denied and application must start over including repayment of fees

IX. ☐ Additional Questions?

City of Albuquerque
Environmental Health Department
Air Quality Program

Public Notice Sign Guidelines

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

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

Applicant Company Name: **Kairos Power, LLC**
Facility Name: **Kairos Power Southwest**

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

- ☒ The sign shall be installed and maintained in a condition such that members of the public can easily view, access, and read the sign at all times.
- ☒ The lower edge of the sign board should be mounted a minimum of 2 feet above the existing ground surface to facilitate ease of viewing

☒ Include at least two pictures of the completed, properly posted sign in the application package immediately following this document. One picture should show the location of the posted sign and the other should be close enough to the sign for the posted information to be legible in the picture.

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

APPENDIX C. NOTICE OF INTENT TO CONSTRUCT

The following pages contain:

- Notice of Intent (NOI) to Construct Form
- Applicant Notice Cover Letter (Updated November 2023)
- Email and Certified Mail Documentation of NOI Sent to Neighborhood Associations and Coalitions
- Pictures of Posted Public Notice Sign

NOTICE FROM THE APPLICANT

Notice of Intent to Apply for Air Quality Construction Permit

You are receiving this notice because the New Mexico Air Quality Control Act (20.11.41.13B NMAC) requires any owner/operator proposing to construct or modify a facility subject to air quality regulations to provide public notice by certified mail or electronic mail to designated representatives of recognized neighborhood associations and coalitions within 0.5-mile of the property on which the source is or is proposed to be located.

This notice indicates that the owner/operator intends to apply for an Air Quality Construction Permit from the Albuquerque – Bernalillo County Joint Air Quality Program. Currently, no application for this proposed project has been submitted to the Air Quality Program. Applicants are required to include a copy of this form and documentation of mailed notices with their Air Quality Construction Permit Application.

Proposed Project Information

Applicant's name and address:
Nombre y domicilio del solicitante:
Kairos Power South West
5201 Hawking Dr. SE
Albuquerque, NM 87106

Owner / operator's name and address:
Nombre y domicilio del propietario u operador:
Kairos Power, LLC
707 W. Tower Ave, Ste. A
Alameda, CA 95401

Contact for comments and inquires:
Datos actuales para comentarios y preguntas:

Name *(Nombre)*: Terrence Williams
Address *(Domicilio)*: 707 W. Tower Ave, Ste. A, Alameda, CA 95401
Phone Number *(Número Telefónico)*: (510) 775-1822
E-mail Address *(Correo Electrónico)*: williams@kairospower.com

Actual or estimated date the application will be submitted to the department:
Fecha actual o estimada en que se entregará la solicitud al departamento: December 13, 2024

Description of the source:
Descripción de la fuente: Manufacturing facility

Exact location of the source or proposed source:
Ubicación exacta de la fuente o fuente propuesta:
5201 Hawking Dr. SE, Albuquerque, NM 87106
UTM Zone 13, 352,990 m E and 3,874,795 m N

Nature of business:
Tipo de negocio: Manufacturing facility (graphite machining and fuel development)

Process or change for which the permit is requested:
Proceso o cambio para el cuál de solicita el permiso:
The addition of two (2) dust collectors, one (1) carbonizing furnace, one (1) Pebbel Development Lab, one (1) engineering testing unit, building exhaust vents, and two (2) diesel pumps.

Maximum operating schedule:
Horario máximo de operaciones: 24 hours a day, 7 days a week, 52 weeks per year, 8760 hr/yr

Normal operating schedule:
Horario normal de operaciones: 24 hours a day, 7 days a week, 52 weeks per year, 8760 hr/yr

Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Estimación preliminar de las cantidades máximas de cada contaminante de aire regulado que la fuente va a emitir:

Air Contaminant *Contaminante de aire*	**Proposed Construction Permit** *Permiso de Construcción Propuesto*		**Net Changes (for permit modification or technical revision)** *Cambio Neto de Emisiones (para modificación de permiso o revisión técnica)*	
	pounds per hour *libras por hora*	tons per year *toneladas por año*	pounds per hour *libras por hora*	tons per year *toneladas por año*
NO_x	76.52	20.97	+4.89	+3.02
CO	50.28	13.63	+10.08	+3.43
VOC	4.20	1.18	+0.43	+0.24
SO_2	10.77	2.72	+10.30	+2.58
PM_{10}	2.87	1.52	+0.59	+0.93
$PM_{2.5}$	2.75	2.73	+0.47	+2.14
HAP	4.65	0.77	+4.41	+0.71

NOTE: To add extra rows for H_2S or Pb in Word, click in a box in the last row. Click the plus (+) sign that appears on the right of the row to add a row.

Questions or comments regarding this Notice of Intent should be directed to the Applicant. Contact information is provided with the Proposed Project Information on the first page of this notice. To check the status of an Air Quality Construction Permit application, call 311 and provide the Applicant's information, or visit www.cabq.gov/airquality/air-quality-permits.

The Air Quality Program will issue a Public Notice announcing a 30-day public comment period on the permit application for the proposed project when the application is deemed complete. The Air Quality Program does not process or issue notices on applications that are deemed incomplete. More information about the air quality permitting process is attached to this notice.

Air Quality Construction Permitting Overview

This is the typical process to obtain an Air Quality Construction Permit for Synthetic Minor and Minor sources of air pollution from the Albuquerque – Bernalillo County Joint Air Quality Program.

Step 1: Pre-application Meeting: The Applicant and their consultant must request a meeting with the Air Quality Program to discuss the proposed action. If air dispersion modeling is required, Air Quality Program staff discuss the modeling protocol with the Applicant to ensure that all proposed emissions are considered.

> **Notice of Intent from the Applicant:** Before submitting their application, the Applicant is required to notify all nearby neighborhood associations and interested parties that they intend to apply for an air quality permit or modify an existing permit. The Applicant is also required to post a notice sign at the facility location.

Step 2: Administrative Completeness Review and Preliminary Technical Review: The Air Quality Program has 30 days from the day the permit is received to review the permit application to be sure that it is administratively complete. This means that all application forms must be signed and filled out properly, and that all relevant technical information needed to evaluate any proposed impacts is included. If the application is not complete, the permit reviewer will return the application and request more information from the Applicant. Applicants have three opportunities to submit an administratively complete application with all relevant technical information.

> **Public Notice from the Department:** When the application is deemed complete, the Department will issue a Public Notice announcing a 30-day public comment period on the permit application. This notice is distributed to the same nearby neighborhood associations and interested parties that the Applicant sent notices to, and published on the Air Quality Program's website.
>
> During this 30-day comment period, individuals have the opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing. If approved by the Environmental Health Department Director, Public Information Hearings are held after the technical analysis is complete and the permit has been drafted.

Step 3: Technical Analysis and Draft Permit: Air Quality Program staff review all elements of the proposed operation related to air quality, and review outputs from advanced air dispersion modeling software that considers existing emission levels in the area surrounding the proposed project, emission levels from the proposed project, and meteorological data. The total calculated level of emissions is compared to state and federal air quality standards and informs the decision on whether to approve or deny the Applicant's permit.

Draft Permit: The permit will establish emission limits, standards, monitoring, recordkeeping, and reporting requirements. The draft permit undergoes an internal peer review process to determine if the emissions were properly evaluated, permit limits are appropriate and enforceable, and the permit is clear, concise, and consistent.

> **Public Notice from the Department:** When the technical analysis is complete and the permit has been drafted, the Department will issue a second Public Notice announcing a 30-day public comment period on the technical analysis and draft permit. This second Public Notice, along with the technical analysis documentation and draft permit, will be published on the Air Quality Program's website, and the public notice for availability of the technical analysis and draft permit will only be directly sent to those who requested further information during the first comment period.

During this second 30-day comment period, residents have another opportunity to submit written comments expressing their concerns or support for the proposed project, and/or to request a Public Information Hearing.

Possible Public Information Hearing: The Environmental Health Department Director may decide to hold a Public Information Hearing for a permit application if there is significant public interest and a significant air quality issue. If a Public Information Hearing is held, it will occur after the technical analysis is complete and the permit has been drafted.

Step 4: Public Comment Evaluation and Response: The Air Quality Program evaluates all public comments received during the two 30-day public comment periods and Public Information Hearing, if held, and updates the technical analysis and draft permit as appropriate. The Air Quality Program prepares a response document to address the public comments received, and when a final decision is made on the permit application, the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process. If no comments are received, a response document is not prepared.

Step 5: Final Decision on the Application: After public comments are addressed and the final technical review is completed, the Environmental Health Department makes a final decision on the application. If the permit application meets all applicable requirements set forth by the New Mexico Air Quality Control Act and the federal Clean Air Act, the permit is approved. If the permit application does not meet all applicable requirements, it is denied.

Notifications of the final decision on the permit application and the availability of the comment response document is published on the Air Quality Program's website and distributed to the individuals who participated in the permit process.

The Department must approve a permit application if the proposed action will meet all applicable requirements and if it demonstrates that it will not result in an exceedance of ambient air quality standards. Permit writers are very careful to ensure that estimated emissions have been appropriately identified or quantified and that the emission data used are acceptable.

The Department must deny a permit application if it is deemed incomplete three times, if the proposed action will not meet applicable requirements, if estimated emissions have not been appropriately identified or quantified, or if the emission data are not acceptable for technical reasons.

For more information about air quality permitting, visit www.cabq.gov/airquality/air-quality-permits

Fill out the required highlighted information below. Then use the Subject as the Subject line of the required public notice email(s) sent to nearby neighborhood associations/neighborhood coalitions. Copy and paste the rest of the completed information on this page into the body of the email(s) and attach the completed NOI form. If providing notice by certified mail, use this page as the cover letter and attach the NOI form.

SUBJECT: Public Notice of Proposed Air Quality Construction Permit Application Kairos Power LLC – Kairos Power Southwest

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Kairos Power, LLC
Site or Facility Name	Kairos Power Southwest
Site or Facility Address	5201 Hawking Dr. SE, Albuquerque, NM 87106
New or Existing Source	EXISTING
Anticipated Date of Application Submittal	December 13, 2024
Summary of Proposed Source to Be Permitted	The application is to modify existing Construction Permit #1958-M1-1AR. The modification includes the addition of two (2) dust collectors, one (1) carbonizing furnace, one (1) Pebble Development Lab, one (1) engineering testing unit, building exhaust vents, and two (2) diesel pumps.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:
- Terrence Williams
- williams@kairospower.com
- (510) 775-1822

For inquiries regarding the air quality permitting process, contact:
- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov
- (505) 768-1972

Daniel Dolce

From: Daniel Dolce
Sent: Wednesday, December 11, 2024 4:17 PM
To: info@willsonstudio.com; m.ryankious@gmail.com
Cc: Adam Erenstein; Terrence Williams
Subject: Public Notice of Proposed Air Quality Construction Permit Application: Kairos Power LLC – Kairos Power Southwest
Attachments: KPSW_NOI to Construct Request.pdf; KPSW_NOI Cover Letter.pdf

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Kairos Power, LLC
Site or Facility Name	Kairos Power Southwest
Site or Facility Address	5201 Hawking Dr. SE, Albuquerque, NM 87106
New or Existing Source	EXISTING
Anticipated Date of Application Submittal	December 13, 2024
Summary of Proposed Source to Be Permitted	The application is to modify existing Construction Permit #1958-M1-1AR. The modification includes the addition of two (2) dust collectors, one (1) carbonizing furnace, one (1) Pebble Development Lab, one (1) engineering testing unit, building exhaust vents, and two (2) diesel pumps.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:
- Terrence Williams
- williams@kairospower.com
- (510) 775-1822

For inquiries regarding the air quality permitting process, contact:
- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov

- (505) 768-1972

Thank you and regards,
Daniel Dolce

Daniel Dolce
Consultant

P 505.266.6611, Ext. 3208 M 505.818.8761
Email: Daniel.Dolce@trinityconsultants.com
9400 Holly Avenue NE, Building 3, Suite B, Albuquerque, NM 87122

Want to meet? Book a meeting with Daniel Dolce at Trinity Consultants.

Connect with us: LinkedIn / YouTube / trinityconsultants.com (UPDATED WEBSITE!)

View our capabilities in the Environmental Consulting, Built Environment, Life Sciences, and Water & Ecology markets.

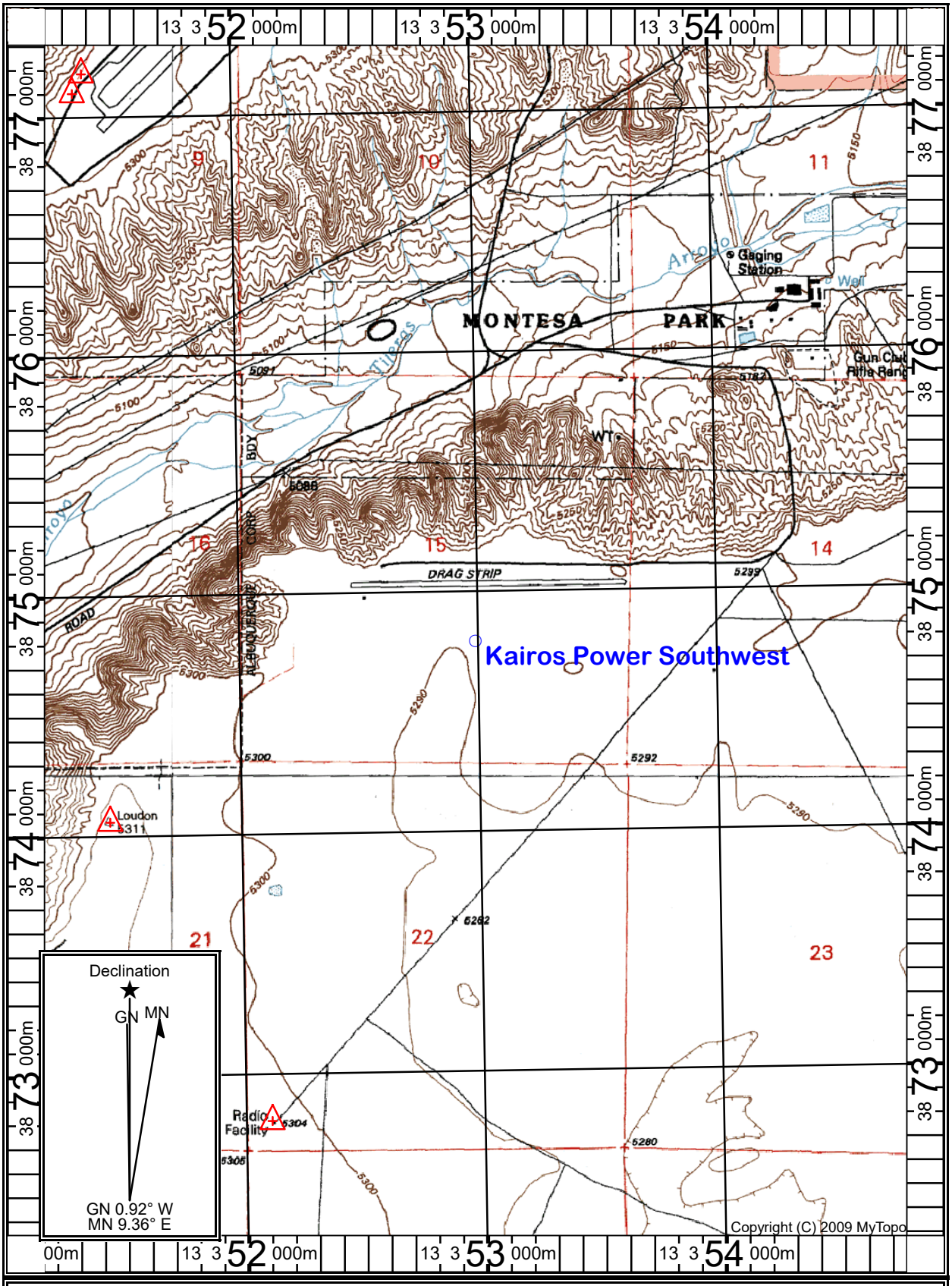

Proposed Air Quality Construction Permit
Permiso de Construcción de Calidad del Aire Propuesto
1. Applicant's Name: Kairos Power Southwest
Owner or Operator's Name: Kairos Power, LLC
2. Actual or Estimated Date the Application will be Submitted to the Department: December 6, 2024
3. Exact Location of the Source or Proposed Source: 5201 Hawking Dr SE, Albuquerque, NM 87106
UTM Zone 13, 352,990 m E and 3,874,795 m N
4. Description of the Source: Manufacturing Facility
Nature of Business: Manufacturing Facility (graphite machining and fuel development)
Process or change for which a permit is requested: The addition of two dust collectors, one carbonizing furnace, one pebble development lab, one engineering testing unit, building exhaust vents, and two diesel pumps.
Preliminary estimate of the maximum quantities of each regulated air contaminant the source will emit:
Proposed Construction Permit
Net Change Emissions
Cambio Neto de Emisiones
Tons per year
24 hours/day, 7 days/week, 52 weeks/year, 8760 hours/year
24 hours/day, 7 days/week, 52 weeks/year, 8760 hours/year
Terrence Williams
707 W. Tower Ave, Ste A, Alameda, CA 94501
(510) 775-1822
williams@kairospower.com


Kairos Power
MAIN
ENTRANCE

APPENDIX D. FACILITY LOCATION AND AERIAL PHOTOGRAPH

The following pages contain:

- A 7.5 minute topographic quadrangle map including a city of Albuquerque zone atlas map that shows the proposed location of each process equipment unit involved in the proposed modification
- An aerial photograph showing the proposed location of each process equipment unit involved in the proposed modification of the source



Map Name: ALBUQUERQUE EAS Scale: 1 inch = 2,000 ft. Horizontal Datum: WGS84
Print Date: 06/13/24 Map Center: 13 0352989 E 3874795 N


Aerial Imagery
Kairos Power Southwest
EX6
EX7
EX5
EX4
DC1
CARB1
EX3
ETU3
ETU1
EX2
EX1
Kairos Power
Kairos Power
Google Earth
Image © 2024 Airbus
300 ft
N

APPENDIX E. ZONING REQUIREMENTS

The following page contains the following for zoning requirements of the KPSW facility:

- Zoning Requirement Cover Letter (Revised November 3, 2023)
- Zone Designation Letter from the City of Albuquerque (Dated October 24, 2024)
- Zone Designation Request to the City of Albuquerque (Dated August 27, 2024)

City of Albuquerque
Environmental Health Department
Air Quality Program

Construction Permit (20.11.41 NMAC)
Zoning Requirement Cover Letter

This Cover Letter Must Be Returned With The Application Along With All Required Attachments

The Albuquerque-Bernalillo County Joint Air Quality Program, which administers and enforces local air quality laws for the City of Albuquerque ("City") and Bernalillo County ("County"), on behalf of the City Environmental Health Department ("Department").

Any person seeking a new air quality permit or a permit modification under 20.11.41 NMAC (Construction Permits) shall provide documentary proof that the proposed air quality permitted use of the facility's subject property is allowed by the zoning designation of the City or County zoning laws, as applicable. Sufficient documentation may include (i) a zoning certification from the City Planning Department or County Department of Planning and Development Services, as applicable, if the applicant is subject to City or County zoning jurisdiction; or (ii) a zoning verification from both planning departments if the applicant is not subject to City or County zoning jurisdiction. A zone atlas map shall not be sufficient. At this time, applicants are not required to submit documentation for the subject property's zoning designation when applying for a relocation of a portable stationary source, or a technical or administrative revision to an existing permit.

The Department will rule an application administratively incomplete if it is missing or has incorrect information. If the Department has ruled an application administratively incomplete three (3) times, the Department will deny the permit application. Any fees submitted for processing an application that has been denied will not be refunded. If the Department denies an application, a person may submit a new application and the fee required for a new application. The applicant has the burden of demonstrating that a permit should be issued.

The Department may require additional information that is necessary to make a thorough review of an application. At all times before the Department has made a final decision regarding the application, an applicant has a duty to promptly supplement and correct information the applicant has submitted in an application to the Department. The applicant's duty to supplement and correct the application includes, but is not limited to, relevant information acquired after the applicant has submitted the application and additional information the applicant otherwise determines is relevant to the application and the Department's review and decision. While the Department is processing an application, regardless of whether the Department has determined the application is administratively complete, if the Department determines that additional information is necessary to evaluate or make a final decision regarding the application, the Department may request additional information and the applicant shall provide the requested additional information.

NOTICE REGARDING SCOPE OF A PERMIT: The Department's issuance of an air quality permit only authorizes the use of the specified equipment pursuant to the air quality control laws, regulations and conditions. Permits relate to air quality control only and are issued for the sole purpose of regulating the emission of air contaminants from said equipment. Air quality permits are not a general authorization for the location, construction and/or operation of a facility, nor does a permit authorize any particular land use or other form of land entitlement. It is the applicant's/permittee's responsibility to obtain all other necessary permits from the appropriate agencies, such as the City Planning Department or County Department of Planning and Development Services, including but not limited to site plan approvals, building permits, fire department approvals and the like, as may be required by law for the location, construction and/or operation of a facility. For more information, please visit the City Planning Department website at https://www.cabq.gov/planning and the County Department of Planning and Development Services website at https://www.bernco.gov/planning.

Corporate and Facility Information: This information shall match the information in the permit application**.**

Air Quality Permit Applicant Company Name: **Kairos Power, LLC**			
Facility Name: Kairos Power Southwest			
Facility Physical Address: **5201 Hawking Dr. SE**	City: **Albuquerque**	State: **NM**	Zip: **87106**
Facility Legal Description: **Nuclear Electric Power Generation**			

General Operation Information: This information shall match the information in the permit application.

Permitting action being requested (please refer to the definitions in 20.11.41 NMAC):
☐ New Permit ☒ Permit Modification, Current Permit #: **1958-M1-1AR**

Attachment Information: The location information provided to the City Planning Department or County Department of Planning and Development Services, as applicable, and reflected in the zoning certification or verifications, as applicable, shall be the same as the Facility location information provided to the Department in the air quality construction permit application.

☒ Zoning Certification Provided by: **City Planning** *This is a use-specific certification.* **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/	☐ City Zoning Verification ☐ County Zoning Verification **City Planning Form**: https://www.cabq.gov/planning/code-enforcement-zoning **County Planning Form**: https://www.bernco.gov/planning/planning-and-land-use/applications-forms/

CITY OF ALBUQUERQUE

CODE ENFORCEMENT
Plaza Del Sol Building, Suite 500
600 2nd Street NW
Albuquerque, NM 87102
Tel: (505) 924-3850 Fax: (505) 924-3847

Date: October 28, 2024

VIA Email, williams@kairospower.com
Kairos Power Southwest
Kairos Power LLC
5201 Hawking DR SE
Albuquerque, NM 87106

RE: 5201 HAWKING DR SE, ALBUQUERQUE 87105 the "property".
UPC: 101605230917540201

To Whom It May Concern:

This letter will certify that according to the map on file in this office on October 28, 2024, the referenced property, legally described as **TR D-1-A PLAT OF TRACT D-1-A MESA DEL SOL INNOVATION PARK II(BEING A REPLAT OF TRACT D-1 & D-3 MESA DEL SOL INNOVATIONPARK II) CONT 28.4377 AC** Albuquerque, Bernalillo County, New Mexico, is Zoned: **PLANNED COMMUNITY ZONE DISTRICT (PC.)**

The current uses of the property are Light manufacturing, Research or testing facility and Office all permissive uses in this Zone.

This property has been inspected and was found to be in compliance with the applicable provisions of the Integrated Development Ordinance. The site is within the Mesa del Sol Master Development Plan. The site is controlled by a site development plan, PR 2020-004448. The property is within the Kirtland Air Force Base (AFB) Military Influence Area and the Airport Protection Overlay Zone (Albuquerque International Sunport.) There are no special exceptions associated with this site.

If you have any questions, please contact me at (505) 924-3301 or by email at ametzgar@cabq.gov.

Sincerely:

Angelo Metzgar,
Code Compliance Manager, Code Enforcement, Planning Department

PO Box 1293
Albuquerque
NM 87103
www.cabq.gov

4-2 ALLOWABLE USES

Table 4-2-1: Allowable Uses
P = Permissive Primary C = Conditional Primary A = Permissive Accessory CA = Conditional Accessory
CV = Conditional if Structure Vacant for 5+ years T = Temporary CT = Conditional Temporary
Blank Cell = Not Allowed

Zone District >> / Land Uses	Residential						Mixed-use				Non-residential								Use-specific Standards
	R-A	R-1	R-MC	R-T	R-ML	R-MH	MX-T	MX-L	MX-M	MX-H	NR-C	NR-BP	NR-LM	NR-GM	NR-SU	A	NR-PO B	C	
PRIMARY USES THAT MAY BE ACCESSORY IN SOME ZONE DISTRICTS																			
RESIDENTIAL USES																			
Household Living																			
Dwelling, single-family detached	P	P	P	P	P		P												4-3(B)(1)
Dwelling, mobile home			P																4-3(B)(2)
Dwelling, cluster development	P	P		P	P		P												4-3(B)(3)
Dwelling, cottage development	P	P	P	P	P		P												4-3(B)(4)
Dwelling, two-family detached (duplex)		P		P	P		P												4-3(B)(5)
Dwelling, townhouse				P	P	P	P	P	P	P									4-3(B)(6)
Dwelling, live-work				C	C	P	P	P	P	P	CA	CA							4-3(B)(7)
Dwelling, multi-family					P	P	P	P	P	P		CV							4-3(B)(8)
Group Living																			
Assisted living facility or nursing home				C	P	P	P	P	P	P									
Community residential facility, small	P	P		P	P	P	P	P	P	P									4-3(B)(9)
Community residential facility, large					P	P	P	P	P	P									4-3(B)(9)
Dormitory						P	C	P	P	P									
Group home, small					C	P	P	P	P										4-3(B)(10)
Group home, medium					C	C	C	P	P	P									4-3(B)(10)
Group home, large						C			C	C									4-3(B)(10)
CIVIC AND INSTITUTIONAL USES																			
Adult or child day care facility			C	C	C	P	P	P	P	P	P	P	A	A					
BioPark																P (in D)			4-3(C)(7)
Cemetery															P				
Community center or library	C	P		P	P	P	P	P	P	P	C	C	C	C		P		C	4-3(C)(1)
Correctional facility															P				
Elementary or middle school	C	C		C	P	P	P	P	P	P	P	P	CV			P		C	4-3(C)(2)
Fire station or police station									P	P	P	P	P	P					
High school	C	C		C	C	P	P	P	P	P	P	P	C			P			4-3(C)(3)
Hospital									P	P	P	P							4-3(C)(4)
Museum				CV	CV	C	P	P	P	P	P	P	P	P		P	A		4-3(C)(5)
Overnight shelter									C	C	C	C	C	C					4-3(C)(6)
Parks and open space	P	P		P	P	P	P	P	P	P	P	P	C	C	A	P	P	P	4-3(C)(7)
Religious institution	P	P		P	P	P	P	P	P	P	P	P	CV	CV					4-3(C)(8)
Sports field							CV	C	P	P	P	P	P	C		P		C	

Table 4-2-1: Allowable Uses
P = Permissive Primary C = Conditional Primary A = Permissive Accessory CA = Conditional Accessory
CV = Conditional if Structure Vacant for 5+ years T = Temporary CT = Conditional Temporary
Blank Cell = Not Allowed

Zone District >>	Residential						Mixed-use				Non-residential								Use-specific Standards
Land Uses	R-A	R-1	R-MC	R-T	R-ML	R-MH	MX-T	MX-L	MX-M	MX-H	NR-C	NR-BP	NR-LM	NR-GM	NR-SU	A	NR-PO B	C	
University or college						CV	CV	C	P	P	P	P	CV	CV					
Vocational school						CV	P	P	P	P	P	P	P	P					
COMMERCIAL USES																			
Agriculture and Animal-related																			
Community garden	P	P	P	P	P	P	P	P	P	P	P	P	C	C		A	A	A	4-3(D)(1)
Equestrian facility	P																P	C	4-3(D)(2)
General agriculture	P											C	P	P			P	A	4-3(D)(3)
Kennel	C							C	C		P	P	P	P					4-3(D)(4)
Nursery	P								A		P	P	P	P		A	A		
Veterinary hospital	C						C	P	P	P	P	P	P	P					4-3(D)(5)
Other pet services	C						C	P	P	P	P	P	P	P					
Food, Beverage, and Indoor Entertainment																			
Adult entertainment												P	P	P					4-3(D)(6)
Auditorium or theater						A	A	A	P	P	P	P	P	P					4-3(D)(7)
Bar							C	C	P	P	P	P	P	P					4-3(D)(8)
Catering service									P	P	P	P	P	P					
Health club or gym			A		A	A	P	P	P	P	P	P	P	A					4-3(D)(9)
Mobile food truck court							C	P	P	P	P	P	P	C					4-3(D)(10)
Nightclub									P	P	P	P	P						4-3(D)(8)
Residential community amenity, indoor	P	P	P	P	P	P	P	P	P	P								C	4-3(D)(11)
Restaurant							C	P	P	P	P	P	P	P					4-3(D)(8)
Tap room or tasting room							C	C	P	P	P	P	P	P					4-3(D)(8)
Other indoor entertainment							C	P	P	P	P	P	P	P		P		C	4-3(D)(12)
Lodging																			
Bed and breakfast	A	CA		A	A	P	P												4-3(D)(13)
Campground or recreational vehicle park									C		P	P					A	C	4-3(D)(14)
Hotel or motel							P	P	P	P	P	P	P	P					4-3(D)(15)
Motor Vehicle-related																			
Car wash								P	P	P	P	P	P	P					4-3(D)(16)
Heavy vehicle and equipment sales, rental, fueling, and repair											P	C	P	P					4-3(D)(17)
Light vehicle fueling station								C	P	P	P	P	P	P					4-3(D)(18)
Light vehicle repair								P	P	P	P	P	P	P					4-3(D)(19)
Light vehicle sales and rental								C	P	P	P	P	P	P					4-3(D)(20)
Outdoor vehicle storage											C	C	P	P			A		4-3(D)(21)
Paid parking lot			A		A	A	C	P	P	A	P	P	P	P	A	A	A		4-3(D)(22)
Parking structure			A		A	A	CA	P	P	P	P	P	P	P	A				4-3(D)(22)
Offices and Services																			
Bank							P	P	P	P	P	P	P	CV					4-3(D)(23)

Table 4-2-1: Allowable Uses
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Zone District >>	Residential						Mixed-use				Non-residential								Use-specific Standards
Land Uses	R-A	R-1	R-MC	R-T	R-ML	R-MH	MX-T	MX-L	MX-M	MX-H	NR-C	NR-BP	NR-LM	NR-GM	NR-SU	NR-PO A	NR-PO B	NR-PO C	
Blood services facility									C	C	C	P	P	P					
Club or event facility							C	P	P	P	P	P	P	CV		P	P	C	4-3(D)(24)
Commercial services								P	P	P	P	P	P	P					
Construction contractor facility and yard										C	P	P	P	P					4-3(D)(25)
Crematorium															P				
Medical or dental clinic							P	P	P	P	P	P	P	P					4-3(D)(26)
Mortuary								C	P	P	P	P	C		A				
Office							P	P	P	P	P	P	P	P					
Personal and business services, small							P	P	P	P	P	P	P	P					4-3(D)(27)
Personal and business services, large									P	P	P	P	P	P					4-3(D)(27)
Research or testing facility							P	P	P	P	P	P	P	P					4-3(D)(28)
Self-storage								C	C	P	P	P	P	P			A		4-3(D)(29)
Outdoor Recreation and Entertainment																			
Amphitheater										C	C	C	C	C	A	P	A	C	
Balloon Fiesta Park events and activities																P			4-3(D)(30)
Drive-in theater									C	C	C	C	C						4-3(D)(31)
Fairgrounds															P				
Residential community amenity, outdoor	P	P	P	P	P	P	P	P	P	P								A	
Stadium or racetrack															P	P			
Other outdoor entertainment	CA	CA	CA	CA	CA	CA	A	A	A	A	P	P	P	A		P		P	4-3(D)(32)
Retail Sales																			
Adult retail										P		P	P	P					4-3(D)(6)
Art gallery	CV	CV	C	P	P	P	P	P	P	P	P		P	A					4-3(D)(33)
Bakery goods or confectionery shop							C	P	P	P	P	P	P	P					
Building and home improvement materials store									C	C	P	P	P	C					4-3(D)(34)
Cannabis retail								P	P	P	P	P	A	A					4-3(D)(35)
Farmers' market	T		T	T	T	T	T	P	P	P	P	P	CV	CV		P	A	CA	4-3(D)(36)
General retail, small			A			A	P	P	P	P	P	P	P	P					4-3(D)(37)
General retail, medium									P	P	P	C	C						4-3(D)(37)
General retail, large									C	C	P	P							4-3(D)(37)
Grocery store								P	P	P	P		P	P					4-3(D)(38)
Liquor retail							C	A	C	C	C	C	C	C					4-3(D)(39)
Nicotine retail							CA	A	C	C	C	C	C	C					4-3(D)(40)
Pawn shop								C	P	P	P	P	P	P					4-3(D)(41)

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Zone District >> / Land Uses	Residential						Mixed-use				Non-residential								Use-specific Standards
	R-A	R-1	R-MC	R-T	R-ML	R-MH	MX-T	MX-L	MX-M	MX-H	NR-C	NR-BP	NR-LM	NR-GM	NR-SU	NR-PO A	NR-PO B	NR-PO C	
Transportation																			
Airport															P				4-3(D)(42)
Freight terminal or dispatch center												C	P	P					4-3(D)(43)
Helipad									CA	CA	A	P	P	P	A				4-3(D)(44)
Park-and-ride lot						C	C	C	P	C	C	P	C	C	A	A			4-3(D)(45)
Railroad yard												C	P	P					4-3(D)(46)
Transit facility						C	C	C	P	P	P	P	P	P					4-3(D)(47)
INDUSTRIAL USES																			
Manufacturing, Fabrication, and Assembly																			
Artisan manufacturing							C	P	P	P	P	P	P	P					4-3(E)(1)
Cannabis cultivation							C	P	P	P	P	P	P	P					4-3(E)(2)
Cannabis-derived products manufacturing							C	P	P	P	P	P	P	P					4-3(E)(3)
Light manufacturing										A	P	P	P	P					4-3(E)(4)
Heavy manufacturing														P					4-3(E)(5)
Natural resource extraction															P				4-3(E)(6)
Special manufacturing														C					4-3(E)(7)
Telecommunications, Towers, and Utilities																			
Drainage facility	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A	A	C	
Electric utility	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A	A	A	4-3(E)(8)
Energy Storage System (ESS)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A	A	A	4-3(E)(9)
Geothermal energy generation	A	A	A	A	A	A	A	A	A	A	A	P	P	P		A	A		4-3(E)(10)
Major utility, other	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A	A	A	
Solar energy generation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	4-3(E)(11)
Wind energy generation							A	A	A	A	A	A	A	C	A	A	A		4-3(E)(12)
Wireless Telecommunications Facility (WTF)																			4-3(E)(13)
Architecturally integrated	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
Collocation	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
Freestanding							P	P	P	P	P	P	P	P	A				
Non-commercial or broadcasting antenna	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
Public utility collocation	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
Roof-mounted			A		A	A	A	A	A	A	A	A	A	A	A				
Small cell	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Waste and Recycling																			
Recycling drop-off bin facility						A	A	A	A	A	P	P	P	P					4-3(E)(14)
Salvage yard												C	C	P					4-3(E)(15)
Solid waste convenience center															P				4-3(E)(16)
Waste and/or recycling transfer station															P				4-3(E)(17)

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Land Uses	R-A	R-1	R-MC	R-T	R-ML	R-MH	MX-T	MX-L	MX-M	MX-H	NR-C	NR-BP	NR-LM	NR-GM	NR-SU	A	NR-PO B	C	
Wholesaling and Storage																			
Above-ground storage of fuels or feed													C	P					
Outdoor storage								CA	C	C	C	A	P	P					4-3(E)(18)
Warehousing									C	C	P	P	P	P					4-3(E)(19)
Wholesaling and distribution center									C	C	P	P	P	P					4-3(E)(20)
ACCESSORY AND TEMPORARY USES																			
ACCESSORY USES																			**4-3(F)(1)**
Agriculture sales stand	A	A	A	A	A	A	A	A	A	A	A	A	CA	CA			A		4-3(F)(2)
Animal keeping	A	A	A	A	A	A	A	A	A	A	A	A	A	A				CA	4-3(F)(3)
Automated Teller Machine (ATM)			A		A	A	A	A	A	A	A	A	A	A		T	T		
Clean Room												CA	A	A					4-3(F)(4)
Drive-through or drive-up facility								A	A	CA	A	A	A						4-3(F)(5)
Dwelling unit, accessory	A	A		A	A		A	A	A		A	A	A	A	A		A		4-3(F)(6)
Family care facility	A	A	A	A	A	A	A	A	A	A									4-3(F)(7)
Family home day care	CA	CA	CA	CA	A	A	A												4-3(F)(8)
Garden	A	A	A	A	A	A	A	A	A	A	A	A	A				A		
Hobby breeder	A	A	A	A															4-3(F)(9)
Home occupation	A	A	A	A	A	A	A	A	A	A									4-3(F)(10)
Independent living facility				A	A	A	A	A	A	A									4-3(F)(11)
Mobile food truck	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			4-3(F)(12)
Mobile vending cart							A	A	A	A	A	A	A	A		A		A	4-3(F)(13)
Outdoor animal run	A							CA	CA		CA		A	A					4-3(F)(14)
Outdoor dining area							CA	A	A	A	A	A	A	A	A				4-3(F)(15)
Second kitchen in a dwelling	A	A	A	A	A	A	A												4-3(F)(16)
Other use accessory to non-residential primary use							A	A	A	A	A	A	A	A	A			A	4-3(F)(17)
Other use accessory to residential primary use	A	A	A	A	A	A	A	A	A	A									4-3(F)(18)
TEMPORARY USES																			
Temporary Uses That Require A Permit																			
Circus									T		T	T	T						4-3(G)(1)
Construction staging area, trailer, or office	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		4-3(G)(2)
Dwelling, temporary	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		4-3(G)(3)
Fair, festival, or theatrical performance	T	T	T	T	T	T	T	T	T	T	T	T			T	T	T		4-3(G)(4)
Film production	T	T	T	T	T	T	T	T	T	T	T	T	T	T		T			4-3(G)(5)
Open air market							T	T	T	T	T						T		4-3(G)(6)

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Park-and-ride facility, temporary						T	T	T	T	T	T	T	T	T	T		T		4-3(G)(7)
Real estate office or model home	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T				4-3(G)(8)
Safe outdoor space							CT	CT	CT	CT	T	T	T	T					4-3(G)(9)
Seasonal outdoor sales							T	T	T	T	T	T	T	T					4-3(G)(10)
Temporary use not listed			T			T	T	T	T	T	T	T	T	T	T		T		4-3(G)(11)
Temporary Uses That Do Not Require A Permit																			
Garage or yard sale	T	T	T	T	T	T	T												4-3(G)(12)
Hot air balloon takeoff/landing	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	4-3(G)(13)

CITY OF ALBUQUERQUE PLANNING DEPARTMENT
CODE ENFORCEMENT DIVISION

REQUEST FOR ZONAL CERTIFICATION

A zoning certification letter is written confirmation provided by the City of Albuquerque referencing the zoning designation of a particular piece of property, listing certain compliance information, and whether or not the existing development on the property is considered a permitted use.

A completed certification letter includes the assigned address, legal description and zoning designation of the subject site; if applicable, reference to the overlay district, sector plan, development plan, project number and/or pertinent special exceptions(variance, conditional use approvals, etc.), and either a statement confirming zoning compliance or a brief description of any outstanding zoning code violations affecting the site.

A certification letter does not include reference to the zoning designations of abutting or nearby properties; copies of site plans, special exceptions, certificates of occupancy, or other approvals; or reference to building codes, fire codes, subdivision requirements, flood plain standards or similar development prerequisites.

There is a $200 fee plus a 2% Technolgy Fee for each separate parcel, even if the property includes multiple contiguous parcels held in single ownership. A minimum processing period of thirty (30) business days from receipt of the completed application and full payment can be expected; but depending upon the related research, necessary site inspections, and similar service demands, some certification letters may take up to 45 business days to complete.

Please return this completed application form and related fee by mail or in person to:
City of Albuquerque – Code Enforcement Division, 600 2nd St. NW, Suite 500, Albuquerque, New Mexico 87102

APPLICATION FOR ZONAL CERTIFICATION

PROPERTY TO BE CERTIFIED

ADDRESS: 5201 Hawking Dr SE, Albuquerque, NM 87106

LOT(S)*: TR D-1-A PLAT OF TRACT D-1-A MESA DEL SOL INNOVATION PARK II(BEING A REPLAT OF TRACT D-1 & D-3 MES BLOCK: N/A

SUBDIVISION: Legal Description: TR D-1-A PLAT OF TRACT D-1-A MESA DEL SOL INNOVATION PARK II(BEING A REPLAT OF TRACT D-1 & D-3 MESA DEL SOL INNOVATIONPARK II) CONT 28.4377 AC

UNIFORM PROPERTY CODE*: 101605230917540201

There is a $165 research/administration fee, $35 application fee and a 2% Technology Fee ($204 total) for each separate parcel included in the property, even if there are multiple parcels held in single ownership and/or assigned the same UPC number.

APPLICANT

NAME: Kairos Power Southwest

COMPANY / ORG.: Kairos Power, LLC

ADDRESS: 5201 Hawking Dr SE, Albuquerque, NM 87106

PHONE: (510) 775-1822 EMAIL: williams@kairospower.com

LETTER SHOULD BE ADDRESSED TO: ☐ SAME AS APPLICANT

NAME:

COMPANY/ORG.:

ADDRESS:

PHONE: EMAIL:

(continued on next page)

CITY OF ALBUQUERQUE PLANNING DEPARTMENT
CODE ENFORCEMENT DIVISION

APPLICATION FOR ZONAL CERTIFICATION

GENERAL PROPERTY INFORMATION

PROPERTY TYPE (retail, multi-family residential, office, etc.): Non-Residential, Light Manufacturing and Chemical Process

SITE AREA (acres or sq. ft.): 28.4377 APPROX. AGE(S) OF EXISTING DEVELOPMENT: _____

TOTAL NUMBER OF BUILDINGS: 4 builidngs

USE FOR EACH BUILDING (e.g., 5 multi-family, 1 office, 2 laundry, 1 garage, etc.): 1 operations, 2 labs, 1 TBD

FOR MULTI-FAMILY RESIDENTIAL DEVELOPMENT:
N/A total number of units
N/A total number of baths
N/A efficiency units
N/A 1 bedroom units
N/A 2 bedroom units
N/A 3 or more bedroom units

NUMBER OF STORIES (note if basements are present): 2 (operations building), 1 for all other buildings

GROSS FLOOR AREA (if multiple buildings, list for each): Operations (3.88 acres), lab (1) (0.40 acres), lab (2) 0.67 acres), TBD (0.12 acres)

TOTAL NUMBER OF SIGNS (both free-standing and building-mounted): 2 standing signs, 1 building-mounted sign

TOTAL NUMBER OF PARKING SPACES: ~216
206 standard spaces
10 handicap accessible spaces
0 motorcycle spaces

I HEREBY AUTHORIZE CITY CODE ENFORCEMENT STAFF TO INSPECT THE SUBJECT PROPERTY FOR THE PURPOSE OF DETERMINING THE STATUS OF THE EXISTING USE AND RELATED ZONING REQUIREMENTS. FURTHER, I UNDERSTAND THAT ANY AND ALL VIOLATIONS NOTED AS A RESULT OF THIS INSPECTION ARE SUBJECT TO IMMEDIATE CORRECTION.

BY: _____ DATE: 23 Aug 2024
OWNER / AGENT SIGNATURE

OFFICIAL USE ONLY

ACCEPTED BY: G Delgado DATE: 8.27.24

ZONE: _____ ZAP: _____ ASSIGNED TO: _____

Technology Fee 2%

Fee:	441008 - 4919000 $200
Tech Fee:	445048 - 4910000 $ 4
Total:	$204

*Applications are not processed until all fees have been paid.