PERMIT NUMBER:	100094	**App. ID(s):**	409098
BUSINESS NAME:	CALGON CARBON CORPORATION	**Revision(s):**	1.0.0.0
SOURCE TYPE:	PROCESSING OF ACTIVATED CARBON	**Revision Type(s):**	RENEWAL
PERMIT ENGINEER:	ERF	**Date Prepared:**	Click here to enter a date.

BACT: Yes **MACT:** No **NSPS:** No **SYNTH MINOR:** No **AIRS:** No

DUST PLAN REQUIRED: No **DUST PLAN RECEIVED:** No

O&M PLAN REQUIRED: Yes **O&M PLAN RECEIVED:** Yes

PORTABLE SOURCE: No **SITE VISIT: Yes** **01/13/2016**

AGREEMENT OF CONFIDENTIALITY:
An agreement of confidentiality was established with the source during the initial drafting phase of the new permit process. The following information is considered confidential for this source;

- *Process description and process flow diagram, including process equipment type and specifications;*
- *Emission estimates and calculations specific to process equipment, with the exception of the site-wide PTE profile and/or emission limits.*

PROCESS DESCRIPTION:

Overview
Calgon Carbon Corporation of Gila Bend, AZ (Calgon) recycles used (spent) activated carbon from water treatment and potable goods treatment operations. The process is called reactivation. [redacted]

A material balance approach to estimating emissions from this source has not been performed. However, the source is permitted only for the reactivation of carbon from municipal water and potable goods treatment operations; which prevents potential emissions of industrial pollutants such as lead or mercury. And performance testing requirements have been incorporated into the permit in order to establish an actual emissions profile.

Multiple pollutants are potentially contained in the input material and are mitigated from the kiln effluent by a 3-phase control train (thermal oxidation, dry sorbent scrubbing and particulate filtering) [redacted] the potential for unconsumed emissions is high, without controls. Therefore, sulfurous compounds from water treatment facilities can potentially evolve high sulfur dioxide (SO_2) emissions from the reactivation process. Potential HAP emissions such as hydrochloric acid (HCl) and hydrogen sulfide (H_2S) are present in the effluent along with a number of metals such as manganese. Carbon monoxide (CO) and oxides of nitrogen (NOx) are potential pollutants [redacted]. The thermal oxidizer also uses natural gas. All of these emissions including effluent from natural gas combustion are normally routed through the control train and out of the stack and are captured by performance testing.

CO, NOx and particulate can also be released from the material being processed during a bypass event. In a bypass event, control systems are shut down and process effluent is bypassed to the ambient. The kilns are flooded with ambient air, which contributes to a partially combustive process and releases a very thick, smoky

effluent from the kilns. Bypass emissions containing concentrations of CO and particulate beyond the permitted thresholds have been tested separately and are discussed further in this document.

Controls

The effluent stream from the kilns containing the impurities removed from the carbon is routed through a natural gas fired 5.5 MMBTU/hr and vertically downfired thermal oxidizer (TO). The TO comprises the first step in a 3-phase control train and is intended to mitigate emissions of combustible pollutants such as volatile organic compounds (VOC) and CO. Some amounts of H_2S may also be mitigated by combustive control, resulting in water and elemental sulfur.

Once process effluent has been combusted by the TO, the effluent is routed downstream to be treated in a dry injection sorbent retention chamber (DSI) prior to flowing into the particulate collection array (baghouse). The DSI functions as a scrubber by injecting a calcium hydroxide compound or "sorbent" material (SBC) fluidized with fresh (filtered) inlet air directly into the retention chamber to mix with the process effluent. The dry CaOH material is pneumatically injected in powdered form, however water may be used as a temperature quench up stream of the DSI. Once in the retention chamber the CaOH provides a catalyst for the neutralization of HCl, H_2S and SOx according to the following;

$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$
$Ca(OH)_2 + SO_2 \rightarrow CaSO_3 + H_2O$
$Ca(OH)_2 + SO_2 + ½O_2 \rightarrow CaSO_4 + H_2O$
$Ca(OH)_2 + H_2S \rightarrow CaS + 2H_2O$

The CaOH compound (Sorbacal, see MSDS, attached) also contains a flocculating agent to make these salts and byproducts of both the DSI and TO better able to be removed by the particulate collection array. An SO_2 monitor is provided at the outlet to measure the amount of SO_2 that remains in the gas stream. The SO_2 monitor requires online calibration gases, calibrations are performed automatically. The feed rate of sorbent is either entered manually at the unit or automatically dictated by data feed from outlet SO_2 monitor.

The above neutralizations are conducted within the DSI at temperatures below 800 °F. Process effluent (flu gas) from the thermal oxidizer (TO) must be cooled before entering the DSI and particulate collection array. Process effluent is cooled first by a fresh air bleed in damper and then by a fresh water spray if necessary (water quenching is now automated as part of the Corrective Action Plan, see below). Process effluent is monitored for temperature by sensor identified as "TE101" just upstream of the DSI. Should the fresh air bleed in air damper not be able to provide enough cooling to reach the desired air temperature range, the quenching spray is automatically activated. The quenching spray utilizes a pressurized fresh water line from the plant and compressed air to produce an atomized air fog. During quenching, the solenoid is opened to allow water to flow through the spray lance in 1 GPM increments (starting at 2 GPM to a maximum of 10 GPM) followed by a five second delay to determine if the flow rate is sufficient to lower the temperature within the allowable range at TE101. A high-high temperature alarm (TAHH101) set at 850 °F shall provide a signal to system (via ethernet) which triggers the bypass of the process effluent to the stack at the TO and shutdown the control train exhaust fan, thereby bypassing post TO control elements.

The above described bypass has been triggered on several occasions and has been the point of a compliance and enforcement action against the source. The Permit is clearly written to prohibit any bypass of control measures during operation; explanations for exhaust bypass have been documented via deviation report, many of which do not qualify as emergency events and cannot be categorized as malfunctions as certain bypass events are frequent and even recurring. Part of the resolution to the compliance and enforcement action is the source provides a Corrective Action Plan (CAP) to reduce or eliminate the frequency of bypass events. These corrective action measures are detailed in the section below of the same name. One of the measures specified is that the water quenching mechanism is now controlled automatically to help pre-empt bypass due to high temperature shutdown. The assumption is made that some of the documented high temperature bypass events occurred as a result of improper operation of the effluent cooling system – quenching was not being applied at the needed time or in sufficient manner under manual mode and operation.

Process effluent is cooled and continues to the retention chamber where the SBC is injected, and continues on to the particulate collection array housing where particulate matter (PM) is removed. The effluent then exits the control train, passing through a heat exchanger and out of the exhaust stack to the air shed.

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PERMIT ELEMENTS AND REQUIREMENTS:

Synthetic Minor

Because this source has the potential for major emissions, the source is being characterized as a Synthetic Minor. There are operational requirements contained in the permit to mitigate potential emissions to less than major source levels.

Best Available Control Technology (BACT) / Permitted Limits

The source has taken annual limits on several pollutants to avoid BACT applicability. The following table represents emission limits contained in the permit and revised for this five-year permit renewal analysis;

Pollutant:	12-Month Rolling Emission Limits	Annual BACT Threshold
Carbon Monoxide (CO)	50.0 tons	100 tons
Sulfur Dioxide (SO_2)	22.0 tons	25 tons
Nitrogen Oxides (NOx)	23.0 tons	25 tons
Volatile Organic Compounds (VOC)	21.0 tons	25 tons
PM < 10 Microns Diameter (PM_{10})	11.0 tons	15 tons
PM < 2.5 Microns Diameter ($PM_{2.5}$)	10.0 tons	10 tons
Hydrochloric Acid (HCl)	5,887 pounds	-
Total Hazardous Air Pollutants (HAPs)	14,717 pounds	-

The above values have also been converted to a pound per ton of product produced, to be demonstrated during performance testing, also contained as an enforceable condition in the permit;

Pollutant:	Voluntary Not to Exceed Values [lbs/ton carbon reactivated – on spec, dry basis (output)]
CO:	3.57
SO_2:	1.57
NOx:	1.64
VOC:	1.50
PM_{10}:	0.78
$PM_{2.5}$:	0.71
HCl:	0.21

*** Revisions have been made to the above allowable emissions and the not to exceed values for this renewal ***

- *Daily BACT limits have been removed as per rule change;*

- *The limit for $PM_{2.5}$ and its not to exceed value have been adjusted downward as per rule change. Grandfathering has not been established for $PM_{2.5}$ because the source has not met the requirements of the permit over the current permit term. The above values were set initially as starting points, not as absolute limits. Performance testing was required to understand exactly what the source's emissions profile would be. Now that performance testing data has been provided, the source must either meet the BACT limit or provide a BACT analysis for smoke particulate.*

- *The limit for CO has been raised to 50.0 tpy. Performance testing has indicated that the previous value of 46.0 tpy may not have been sufficient to cap actual emissions from the source during normal operation. The implication of raising this value to 50.0 is this number represents the outside value for this Synthetic Minor source.*

Operational Restrictions

In addition to the type of application the activated carbon was used for, the permit also limits total production of dry on-spec activated carbon to no more than 6,400 lbs per hour. This voluntarily accepted limit for the facility is agreed upon by both Calgon and MCAQD as a means to ensure emissions do not exceed the above emission limits for any pollutant. This material production limit was originally developed before the exact equipment

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specifications were known. [redacted] understanding of an upper bound was necessary in order to permit the source under Non-Title V.

6,400 lb/hr × 8,760 hr/yr / 2,000 lb/ton = 28,032 tpy total annual production - dry basis

Corrective Action Plan

A series of excursions during the twelve month rolling period between October 2014 and 2015 were documented and reported to the department. Thirteen individual events were recorded for this period, constituting a pattern of excursions.

As per the Permit, if a pattern of operation outside the specified operating range develops, as determined by the department, the Permittee shall submit for department approval a Corrective Action Plan (CAP) to bring the devices back into the specified operating range. The CAP is intended to describe measures the source will take immediately to bring the source into compliance with the rules and the permit.

The identified pattern of excursions triggered the requirement to submit a CAP; a compliance action was also initiated against the source. Specifically, the identified pattern of excursions represents an estimated twenty six hours of noncompliance with permit conditions requiring the use of controls at all times the main process is in operation. The source suffered a string of emission control train shutdowns (bypass), due to a variety of reasons, causing process effluent to release from the kilns directly to the air shed. T[redacted]

[redacted]

Provisions contained in the CAP relate mainly to the prevention of internally triggered bypass shutdowns (see attachments). The CAP reiterates the documented excursions and explains what the source believes to be the reasons they occurred. It then describes the steps the source has taken to rectify those problem areas. One example of such a fix is the engagement of the water quenching spray for the DSI. As discussed above, the effluent temperature must be lowered to 800 °F before entering the DSI and baghouse. The programmable logic controller (PLC) is the computer installed to control operations. The PLC controls power, reads temperatures/pressures, provides signals for automated mechanical procedures, etc. The PLC provides display of the process flow for the entire plant within the control room. It is in the control room where all the data the PLC collects and creates is dumped for the operations personnel to read and respond to (if response is necessary, much of the operations are automated and triggered by the PLC). One such peripheral mechanism which was not automated upon initial operation of the plant was the quenching spray. Documentation shows several instances where improper temperature shutdowns occurred as a result of the reading at the TE101 sensor discussed above. Previously, the PLC would send a signal to the control room when the sensor triggered at 825 °F. It should have been at this time that personnel would have engaged the water quench as the air cool mechanism did not provide enough cooling to the effluent. Once the T reached 850 °F, a fail-fail was triggered at the sensor causing a complete bypass shutdown. Now that the quenching system has been programmed to run automatically, there is a better probability (we believe) that this variety of improper temperature shutdown will occur less frequently.

There are many such provisions contained in the CAP. An exhaustive analysis of the CAP is not provided here, but the department is monitoring progress of the source. Further excursions will be reviewed under the light of the CAP and the existing compliance file.

(see “Appendices”, page 8)

Performance Testing

The stoichiometry for the process is complex, any formulation to calculate potential emissions through a mass balance would be difficult. There is no guidance on this process in EPA's AP-42, no MACT or NSPS relating to this process. For these reasons, a conservative approach was initially used to estimate potential emissions based on the average properties of municipal spent carbon types. The results of this analysis indicate that the process, without controls, could potentially release major source levels of emissions of a wide range of pollutants, criteria and HAP. Performance testing requirements have been incorporated into the permit in order to establish an actual emissions profile for CO, NOx, VOC, SO_2, PM and HCl to be used as a basis for forming appropriate permitting and other air regulatory requirements for this source.

The following represents the performance testing history of the source. The source began testing in 2013 once the operational capacity to test under "typical conditions" was achieved, as per requirements of the permit:

protocol_received	TD	result / issue
12/15/2015	01/14/2016	EXCEEDANCES REQUIRE TESTING *
12/15/2014	01/14/2015	SECOND TEST FOR HCL
01/08/2014	02/06/2014	RETEST HCL AND SECOND TEST FOR OTHER POL
05/21/2013	05/30/2013	FAILED HCL EMISSION STANDARD ONLY

The January, 2016 performance test (*) was a requirement of the resolution of the above discussed compliance action against the source. The department determined it was necessary to require the source to performance test the outlet of the kilns, as opposed to the stack, in order to create an emissions profile for bypass events. Bypass events are simply the emissions created when a partial shutdown causes process effluent to bypass controls and is thus not treated by the emissions control train. The results of that testing are identified in this document as "bypass" emissions, and are used to describe and quantify bypass emissions on continual basis. The source is not currently required to perform another such "bypass" performance test under this permit term.

The performance testing schedule contained in the permit states that a stack test (INLET/OUTLET test) will be performed for all identified pollutants each year until two consecutive performance tests result in a "pass" for all pollutants. The source failed for HCl in 2013 but achieved a pass for this pollutant in January 2015. The department believes the source has satisfied the performance testing requirements of the permit. However, because the January, 2016 test revealed an exceedance for CO during the "normal operation" INLET/OUTLET test, the department believes that two more stack tests (all pollutants) for the 2016–2021 permit tem are warranted (rather than just one). A full pass for these tests will allow the Permittee to move to a 5-year test schedule.

Based on the results of all previously conducted testing, the stack test (INLET/OUTLET test) requirements for this permit term and future permit terms are relaxed to include the following:

- carbon monoxide (CO);
- oxides of nitrogen (NOx);
- particulate matter < 10 microns (PM_{10});
- particulate matter < 2.5 microns ($PM_{2.5}$);
- hydrogen chloride (HCl).

SO_2 and VOC emission profiles have been well enough characterized for stack and bypass streams, and have been removed from the required testing regimen. However, the inclusion of testing at the inlet of the thermal oxidizer (INLET) is now standard for all performance testing, in addition to stack (OUTLET) testing for all identified pollutants.

(see "Performance Testing and Site-Specific Emission Factors" graphic summary on page **Error! Bookmark not defined.**; and source spreadsheet / results report in "Appendices", page 8)

PURPOSE FOR APPLICATION:

Renewal and the addition of a bulk loading section. Currently, all spent carbon is brought on site in supersacks via flatbed trailer. With the inclusion of this modification (7-day), a trailer mounted non-road, diesel powered industrial vacuum [redacted] will be used to offload multi compartment bulk trailers. This bulk will be will then either be offloaded into supersacks for staging or deposited directly to the main hopper, which is recessed within the facility floor and enclosed but for the top. A 3-sided concrete partial enclosure will also be constructed

to accommodate staging of carbon bulk delivery. There is no change to the permitted spent carbon processing rate or potential emissions as a result of this addition.

MINOR NEW SOURCE REVIEW:
It is not expected that significant particulate emissions from the new bulk offloading operation would be released to the ambient. Spent activated carbon is delivered wet (primarily water) so the material is expected to be well suppressed. Additionally, by the nature of activated carbon one would expect H_2O (a polar molecule) would be much less likely to evaporate on its own from activated carbon than it would from sand for example. Therefore, the material's own suppressant is likely to remain and keep otherwise potentially disturbed particulate on the surface during staging (within the 3-sided enclosure) or during the material's delivery into the main hopper.

In summary it is determined that Minor NSR for particulate or other pollutant is not triggered by the addition of the bulk loading operation.

HAP EMISSION IMPACTS:
An AERScreen model was performed for HCl based on performance testing data. Under the two scenarios modelled (normal and bypass), screening did not indicate an exceedance against either the Acute Ambient Air Concentration (AAAC) or the Chronic Ambient Air Concentration (CAAC) for that pollutant.

PERMIT HISTORY:

Date Received	Revision Number	Description
06/10/2010	0.0.0.0	Submitted application for new permit. (Issued: 10/14/2011)
11/20/2012	0.0.1.0	Submitted application to; - modify terminology, - add equipment, - change ratings of existing equipment, - change source testing requirements.
Click here to enter a date.	1.0.0.0	Submitted renewal application including modification to include a new bulk loading operation and associated equipment (7-day).

AIR POLLUTION CONTROL EQUIPMENT/EMISSION CONTROL SYSTEM(s):

System description	Comments:
THERMAL OXIDIZER PCC, Pittsburgh, PA 5.5 MM BTU/HR NAT. GAS Control of volatile organic compounds (VOC). Control of carbon monoxide (CO).	O&M on file
DRY INJECTION SORBENT RETENTION CHAMBER (DSI) and PARTICULATE BAGHOUSE Tri-Mer Corp., Owosso, MI UltraTemp Hot Gas Filtration System Model UTF-200 13,000 DSCFM Control of HAP such as hydrogen sulfide (H_2S), hydrogen chloride (HCl) and hydrogen fluoride (HF). Control of sulfur oxides (SOx). Control of dust and smoke particulate matter (PM_{10}, $PM_{2.5}$).	O&M on file
PRESSURE / VACUUM BLOWER PACKAGE CAMCORP, Lenexa, KS Positive displacement blower (Roots blower) provides filtered process air to effluent stream. Fixed cfm, temperature and pressure sensitive to 2-3 psi.	O&M on file
DUST COLLECTORS Feed kiln bins (2x), waste handling (1x), sorbent feed bin (1x), packaging (1x), bulk unloading (1x), bulk loadout (1x). Control of dust particulate (PM_{10}).	O&M on file

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RULE APPLICABILITY:

Public Notice
The revision will have a 30-day public notice period as PM_{10}, $PM_{2.5}$ and CO are at or above the public notice thresholds of Rule 100 §200.

Federal Regulations
Based on information provided in the permit application, the source is not subject to Part 60, 61 or 63 standards.

County Regulations
Rule 100: General Provisions and Definitions
Rule 200: Permit Requirements
Rule 220: Non-Title V Permit Provisions
Rule 241: Minor New Source Review (NSR)
Rule 270: Performance Tests
Rule 280: Fees: Table **A** – Synthetic Minor (see justification on page 3)
Rule 300: Visible Emissions
Rule 310: Fugitive Dust from Dust-Generating Operations – ***Not applicable.*** The applicability of this rule was examined for potentially disturbed surfaces and unpaved areas within the fence line of the facility. Though it appears that there could be an opportunity for vehicular or material staging activities in these areas, there is no reason to assume these activities are integral to operations at the source. Therefore, a prohibition against certain activities which would trigger the applicability of this rule has been incorporated into the permit (see PC 1).

Rule 311: Particulate Matter from Process Industries
Rule 313: Incinerators, Burn-Off Ovens, and Crematories – ***Not applicable.*** [redacted]

Rule 320: Odors and Gaseous Air Contaminants
Rule 323: Fuel Burning Equipment from Industrial/Commercial/Institutional (ICI) Sources – ***Applicable.*** [redacted]

[redacted]

Rule 330: Volatile Organic Compounds – ***Applicable.*** Thermal oxidizer satisfies §301 and performance testing has been performed to demonstrate compliance with §304.1.

APPENDICES:

2010 Letter of Confidentiality Approval

Confidentiality Approval.doc

Revised O&M

OM Plan April 30 2016.pdf

AERScreen File

100094_1000_AERSCREEN.asz

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Maricopa County
Air Quality Department

NON-TITLE V
COMPLETENESS DETERMINATION CHECKLIST

Items 1-15 Front page: Items 1 to 15 (14 for Renewals) must be completed.

Notes to engineer:

- *For renewal applications the source must either answer 'No' to questions 2-5 or submit an application for a permit modification.*
- *Item 8: Many applicants do not know the SIC code or NAICS code for their industry. For a new application the code can be obtained by doing an on-line search. http://www.osha.gov/pls/imis/sicsearch.html*
- *Items 5, 7 and 14: These may be the same for many applicants.*

Complete: ☐ Incomplete: ☐

Item 16: A simple site diagram has been included, preferably on a standard size paper. Detailed blueprints or construction drawings are not required.

Complete: ☐ Incomplete: ☐ N/A: ☐

Item 17: A simple process flow diagram on a standard size paper is preferred. A process flow diagram may not be needed for some small businesses.

Complete: ☐ Incomplete: ☐ N/A: ☐

Item 18: An O&M plan is required only for a control device. An O&M plan is not required for a spray booth. Instead of including the O&M plan with the application, an applicant may submit it after receiving the permit.

Complete: ☐ Incomplete: ☐ N/A: ☐

Item 19: A dust control plan, if required, must accompany the permit application. The plan will be reviewed and approved by the dust compliance group.

Complete: ☐ Incomplete: ☐ N/A: ☐

Item 20: The applicant needs to complete only those sections of the permit application that are applicable.

Complete: ☐ Incomplete: ☐ N/A: ☐

Notes to engineer:

- *Concerning Section Z: Many applicants will not be able to perform these engineering calculations. We will accept the permit application with a blank Section Z.*

Instructions for completing Sections A, B, C, D, E-1, E-2, F, G, H, I, J, K-1, K-2, K-3, K-4, L, M, X-1, X-2, Y and Z of the permit application are included at the beginning of each section and are self-explanatory.

In general, a material safety data sheet (MSDS) is required for each chemical used, stored or processed at the facility. Exceptions are for very common materials, such as gasoline, diesel, acetone, etc.

Business name: **CALGON CARBON CORPORATION**

Permit number: **100094 R 1.0.0.0**

Completeness review completed.
Application determined to be: Complete: [x] Incomplete: ☐

Permit Engineer: **Eric Funderburk** Date: _____

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