
From: Verburg, Ben <Ben.Verburg@arcadis.com>
Sent: Tuesday, November 19, 2019 9:27 AM
To: Neste, David E - DNR
Cc: Jeffrey Howard Danko; Scott D Wahl; Bedard, Michael
Subject: BRRTS# 02-38-580694, Ditch A and Ditch B Activated Carbon
Attachments: Certificate of Disposal Koch W KS 6638.pdf; PFASREACTDOC0919 rev3.pdf

Dave-

The purpose of this email is to provide information of the activated carbon regeneration process for the Ditch A and Ditch B surface water extraction, treatment, and discharge systems associated with the Tyco Fire Technology Center – PFAS site located in Marinette, Wisconsin. TetraSOLV is the supplier for carbon and carbon regeneration and attached to this email is an example of a Certificate of Recycling and per- and polyfluoroalkyl Substances (PFAS) Activated Carbon Reactivation Information Sheet.

Please do not hesitate to call me if you have any questions.

Regards,
Ben

Benjamin J. Verburg, P.E. | Principal Engineer | ben.verburg@arcadis.com
Arcadis | Arcadis U.S., Inc.
126 N. Jefferson Street, Suite 400, Milwaukee WI | 53202 | USA
T. +1 414 276 7742 | D. + 1 414 277 6231 | C. + 1 414 708 9815
Professional Registration/PE-WI, #31794-006

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CERTIFICATE OF RECYCLING

This document certifies all materials from below listed site and service order designation has been re-activated for beneficial re-use in accordance with all applicable state and federal laws pertaining to handling and treatment of waste materials.

Site Location: Koch-Glitsch, LP, 4111 East 37th Street North, Wichita, KS 67220

Sales Order: 6638 **Date:** 07/02/19 **Client / PO:** Ramboll - 1690012348

Materials Treated: 1800 Lbs (dry) Liquid Phase Activated Carbon

A handwritten signature in black ink, appearing to be "E. AR" followed by a long horizontal stroke.

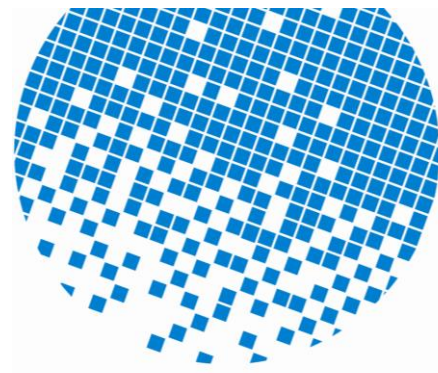
08/19/19

Signature

Date

Signature

Date



**Per & Polyfluoroalkyl Substances (PFAS)
Activated Carbon Reactivation INFOSHEET
Frequently Asked Questions (FAQs)**

What are PFAS?

PFAS are highly persistent/stable man-made chemicals historically used in a number of chemical products and processes. These include the manufacture of Teflon and fire fighting foams among many other applications.

Does activated carbon effectively remove PFAS from the water source?

Activated carbon is an excellent media for removal of PFAS from any water source. The PFAS are present in very low concentrations in most applications. Official guidelines for recommended treatment levels are still being determined at this time, but activated carbon has been shown to be able to remove PFAS to the levels of current technology detection limits (<7 PPT).

Physical Characteristics of PFAS:

- PFAS compounds adsorbed on to GAC can be destroyed at temperatures as low as 700°C (1292°F)
- Some organic fluorine compounds are emitted at temperatures below 900°C (1652°F)
- Successful destruction of the volatilized compounds in the gas phase occurs at a temperature of 1000°C (1832°F)
- Treatment at lower temperatures (~300°C / 572°F) leads to breakdown of PFAS into smaller detectable fluorocarbon compounds

What happens to the PFAS when the spent activated carbon is returned to TetraSOLV for reactivation?

Once your spent activated carbon is received by TetraSOLV at an approved reactivation facility, it is processed as follows:

- The spent activated carbon is fed into a low oxygen reactivation furnace, reaching temperatures of 1800° F
- The PFAS compounds are volatilized from the activated carbon surface, and some will decompose within the reactivation furnace.
- Following the reactivation, the combustion gases with residual PFAS pass through an incinerator which operates at temperature greater than 1850°F with excess oxygen providing complete thermal destruction of the most stable PFAS compounds.

TetraSOLV customers can rely on effective PFAS treatment with activated carbon. The subsequent return of the spent activated carbon and its reactivation provides effective removal and destruction of these persistent ground water, process water and site contaminants.

REFERENCES:

1. Watanabe, N., Takemine, S., Yamamoto, K., Haga, Y., Takata, M. Residual organic fluorinated compounds from thermal treatment of PFOA, PFHxA and PFOS adsorbed onto granular activated carbon (GAC). *Journal of Material Cycles and Waste Management*, 2016, 18:625–630
2. Watanabe, N., Takemine, S., Yamamoto, Y., Takata, M. Thermal mineralization behavior of PFOA, PFHxA, and PFOS during reactivation of granular activated carbon (GAC) in nitrogen atmosphere. *Environmental Science and Pollution Research*