April 30, 2020

David D. Peters | Public Works Director | City of Stuart
Public Works Department
Phone: 772-288-1292 Ext. 1 Email: dpeters@ci.stuart.fl.us
121 SW Flagler Avenue, Stuart, Florida 34994
www.cityofstuart.us

Re: Resin Replacement PFAS

Dear Mr. Peters,

Evoqua Water Technologies (Evoqua) is pleased to submit this budgetary proposal. **Please be advised that this budgetary proposal is a non-binding commitment, is being utilized for review and informational purposes, and does not constitute an offer for acceptance.**

SCOPE OF WORK

- Removal and incineration of GAC/IX hybrid mix in (2) vessels (1,130 cf total)
  - Please note that pricing assumes that material meets the radioactivity acceptance criteria. Otherwise additional costs apply.
- Supply and installation of a hybrid mix of UC1240LD low-density granular activated carbon and PSR2-PLUS resin.
  - Option 1: Approximately 72% resin, 28% GAC
    - 423.6 cf PSR2-PLUS per vessel
    - 163.6 cf UC1240LD per vessel
  - Option 2: Approximately 56% resin, 44% GAC
    - 317.7 cf PSR2-PLUS per vessel
    - 245.4 cf UC1240LD per vessel

EXCHANGE PRICING

Removal & Disposal *Removal and disposal of 1,130 cf exhausted media from two vessels*	**$32,500**
Option 1: 75% Resin, 25% GAC *Installation of 847.2 cf of PSR2-PLUS and 327.2 cf of UC1240LD.*	**$288,432** *Resin: $312.48/cf* *GAC: $72.43/cf*
Option 2: 55% Resin, 45% GAC *Installation of 635.4 cf of PSR2-PLUS and 490.8 cf of UC1240LD.*	**$233,461** *Resin: $321.88/cf* *GAC: $58.93/cf*

This quote is for budgetary purposes only.

COMMERCIAL TERMS

- Evoqua Water Technologies LLC's price does not include, and Evoqua Water Technologies LLC shall not be responsible for, any taxes, permits, tariffs, duties or fees (or any incremental increases to such taxes, permits, tariffs, duties or fees enacted by governmental agencies) unless specifically agreed herein or otherwise by Evoqua Water Technologies LLC in writing.
- The City of Stuart is responsible for disinfection of vessels and piping.

Thank you for this opportunity to provide this budgetary quotation. Please contact me at 954-702-1681 if you have questions or if we may be of further assistance. We look forward to working with you on this project.

Sincerely,

Josh Seidner
Evoqua Water Technologies LLC

Attachments:
Product Bulletins

Westates® Coal Based Granular Activated Carbon - UltraCarb® 830LD and 1240LD Carbons

UltraCarb 830LD and UltraCarb 1240LD are virgin granular activated carbons produced from select grades of coal by a high temperature steam activation process under strict quality control. These materials have a large surface area, very good mechanical hardness, unique pore size distribution, low density, chemical stability and are well suited for liquid phase adsorption applications.

Typical Properties:		
Parameter	**UC 830LD**	**UC1240LD**
Material	Sub-bituminous coal	Sub-bituminous coal
Mesh Size, U.S. Sieve	8x30	12x40
	>8 mesh, 5% max.	>12 mesh, 5%
	<30 mesh, 5% mx.	<40 mesh, 4%
Iodine Number, mg/g	900 min.	900 min.
Hardness Number, min	85	85
Moisture (as packed)	5% max.	5% max.
Apparent Density, g/cc	0.36 - 0.39	0.36 - 0.39
Total Ash, %	12	12
Where applicable, all test methods are per ASTM procedures		

Features and Benefits

- ANSI/NSF Standard 61 approved
- Conforms to requirements established by the current ANSI/AWWA B604
- A detailed quality assurance program guarantees consistent quality from lot to lot and shipment to shipment

Quality Control

UltraCarb activated carbons are extensively quality checked at our State of California certified environmental and carbon testing laboratory located in Los Angeles, CA. Evoqua's laboratory is fully equipped to provide complete quality control analyses using ASTM standard test methods in order to assure the consistent quality of all Westates® carbons. Our technical staff offers hands-on guidance in selecting the most appropriate system, operating conditions and carbon to meet your needs. For more information, contact your nearest Evoqua representative

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Product Data Sheet

DOWEX™ PSR2 Plus Cl Ion Exchange Resin

For Selective Removal of Perchlorate from Potable Water

Description

DOWEX™ PSR2 Plus Cl Ion Exchange Resin is a strong base anion exchange resin for the selective removal of perchlorate from potable water.

Designed to offer exceptional selectivity for perchlorate, the gel matrix also helps achieve high capacity while the uniform particle size (UPS) allows operation at lower pressure losses compared to conventional perchlorate removal resins.

Typical Physical and Chemical Properties

Matrix	Styrene-divinylbenzene, gel
Type	Strong base anion
Physical Form	White to yellow spherical beads
Ionic Form as Shipped	Cl^- Form
Total Exchange Capacity	≥ 0.7 eq/L
Water Retention Capacity	25 – 35%
Particle Size	
Particle Diameter [b]	700 ± 50 µm
Uniformity Coefficient	≤ 1.1
< 300 µm	1% max
Particle Density	1.07 g/mL
Bulk Density, as Shipped [c]	690 g/L (43 lb/ft^3)

[b] For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 177-01775).

[c] As per the backwashed and settled density of the resin, determined by ASTM D-2187.

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Form No. 177-03587, Rev. 1
May 2016

Suggested Operating Conditions

Maximum Operating Temperature	60°C (140°F)
pH Range	0 – 14
Bed Depth, min.	1000 mm (3.1 ft)
Typical Service Flowrate	4 – 64 BV*/h (0.5 – 8 gpm/ft³)
Typical Linear Velocity	12 – 54 m/h (5 – 22 gpm/ft²)

* 1 BV (Bed Volume) = 1 m³ solution per m³ resin or 7.5 gal per ft³ resin

Please contact your Dow representative for system design and application testing details.

Commissioning and Limits of Use

DOWEX™ PSR2 Plus Cl Resin is suitable for use in potable water applications after an initial commissioning pretreatment at ambient temperature.

Note

These resins may be subject to drinking water application restrictions in some countries.

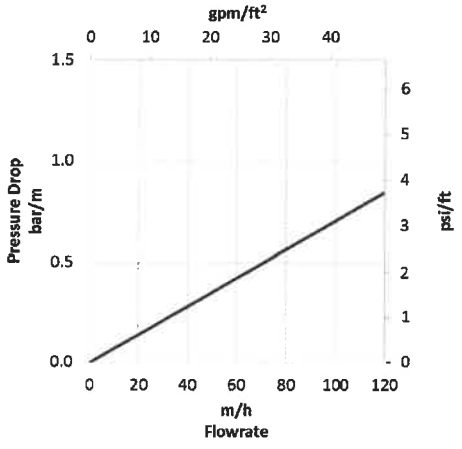
Please check the application status before use and sale.

Hydraulic Characteristics

Pressure drop data for DOWEX™ PSR2 Plus Cl Resin as a function of service flowrate at 20°C (68°F) is shown in Figure 1. The pressure drop for other water temperatures can be calculated with the provided equations. Pressure drop data are valid at the start of the service run with clean water and a correctly classified bed.

Figure 1: Pressure Drop

Temperature = 20°C (68°F)



For other temperatures use:

$P_T = P_{20°C} / (0.026\ T_{°C} + 0.48)$, where P ≡ bar/m

$P_T = P_{68°F} / (0.014\ T_{°F} + 0.05)$, where P ≡ psi/ft

Packaging

- 5-ft³ (0.14-m³) fiber drums
- 1000-L (264-gal) super sacks

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Form No. 177-03587, Rev. 1
May 2016

EVOQUA
WATER TECHNOLOGIES

May 4, 2020

David D. Peters
Public Works Director
City of Stuart
Public Works Department
121 SW Flagler Avenue
Stuart, FL 34994

Subject: Evoqua Qualifications for City of Stuart Resin Replacement

Dear David,

Evoqua Water Technologies LLC (Evoqua), headquartered in Pittsburgh, PA, is a leader in water and wastewater treatment products, systems, and services for industrial and municipal customers. With more than 170 locations worldwide and more than 140 service sites in 7 countries, Evoqua has more than 200,000 equipment installations. Evoqua employs more than 4,000, of which more than 140 are R&D personnel. Evoqua holds more than 1,600 patents and trademarks. One of our key product areas is the application of ion exchange resin for contaminant removal in municipal drinking water.

Our complete turnkey ion exchange resin services include technical support, design and manufacturing of ion exchange resin adsorbers (for sale or rental) and when the ion exchange resin is spent, we provide changeout and installation services, transportation and disposal. We are the preferred supplier of Dowex™ PSR2 Plus Ion Exchange Resin in North America, the resin selected by City of Stuart for replacement of resin in two (2) of the four (4) existing pre-treatment vessels at the City's Water Treatment Facility to remove PFAS from municipal drinking water.

As a complement to our media and equipment options, Evoqua offers a wide range of technical and field support services to help ensure that adsorber and ion exchange systems continue to operate efficiently, downtime is minimized, and plant personnel can stay focused on core operations. From analytical testing in our state-of-the-art laboratories to removal and reinstallation of new ion exchange resin media, Evoqua has the right services for your system and operating budget. We do it all while giving you peace of mind that your liability is minimized and compliance is ensured.

Our media services are offered either on an as-needed basis or as part of a comprehensive preventative maintenance or service contract. All services are performed by trained Evoqua employees who use company-owned transportation and specialty vehicles to perform the services. Our field service personnel have experience in maintaining and operating our own systems as well as equipment provided by other companies. Our technicians provide prompt and courteous service to help customers manage their water treatment system with minimum downtime and maximum use of direct labor and operating budgets. Our trained service technicians are ready to serve customers from more than 85 offices in North America. Local service branches allow us to schedule service and repairs when you need them, not when the airfare is cheaper. We are

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positioned to reach more than 85% of the US population in less than a two-hour drive.

Peace of mind comes from knowing you can reach Evoqua 24 hours a day, seven days a week. Our customer service department is available to assist with information on parts, place orders, locate a local Evoqua service branch or contact a sales representative. If you have technical questions, we have industry experts ready to assist at our toll-free, technical support hotline.

Features and Benefits of Partnering with Evoqua:

- 85 sales and service branches located throughout North America, including seven (7) locations in Florida
- Equipment and services available as rental, and other easy methods of ownership
- OSHA certified and trained technicians
- Experienced personnel with extensive knowledge of federal and state environmental regulations
- Fully equipped testing and analytical laboratory
- Company-owned transportation/specialty vehicles and dedicated potable water transportation vehicles
- 24/7 telephone customer service support

For this opportunity, Evoqua Water Technologies LLC will utilize various facilities to support the City of Stuart service requirements. Locally, the Evoqua Water Technologies LLC service branch in DeLand, FL will provide operational personnel for changeout and installation services as well as support ongoing services at the site.

Evoqua has been selected as the supplier of treatment systems to remove PFAS from well water and surface water plants for drinking water applications with > 40 PFAS treatment installations throughout the United States including the first Dowex PSR2 Plus ion exchange resin system dedicated for PFAS treatment of municipal drinking water in the United States. Attached with this letter is Evoqua's *Position Paper* highlighting our technologies, solutions, and expertise in removing PFAS from contaminated water.

Evoqua takes exceptional pride in the high level of proficiency achieved in our procedures for removal and replacement of spent ion exchange resin. Evoqua has established state-of-the-art industry standards through innovation in equipment and excellence in personnel. The results of these achievements have made "change-outs" a faster, more efficient, smoother, and, most importantly, a safer procedure.

Evoqua maintains its own fleet of potable resin tankers. Fleet ownership provides an essential advantage as it allows control over design, use, safety, and maintenance. For drinking water applications all our service equipment (including potable bulk tankers) is cleaned and maintained in compliance with NSF 61 standards. Bulk resin tankers are washed (NSF 61 Wash Outs) prior to each service event.

Evoqua's service team also follows our Standard Operating Procedures (SOPs) for drinking water resin sluicing service, which have been developed based on our significant experience over the

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30+ years that we have been providing media and associated services within the drinking water market.

In conclusion, Evoqua is uniquely and specially qualified to provide turnkey removal and replacement of the resin/GAC material at the City's Water Treatment Facility. We look forward to working with you on this project.

Best regards,

Josh Seidner

Josh Seidner
Field Sales Engineer
ProAct Environmental Solutions (PES)

Cc: Caitlin Berretta – Evoqua Water Technologies
John Lombardo – Evoqua Water Technologies

Attachment: Position Paper

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POSITION PAPER

PFAS REMOVAL FROM CONTAMINATED WATER

Pittsburgh, PA

Number 1

CARBON AND RESIN SOLUTIONS FOR PFAS

Contaminants known as perfluoroalkyl substances (PFAS) are increasingly being detected in water samples around the globe, even in remote areas far from manufacturing sources. The United States has been at the forefront of PFAS detection with many communities in different parts of the country raising concerns, which has created high-profile stories in the news. A 2016 study conducted by Harvard University found water supplies that serve 16.5 million people were contaminated with PFAS. Water supplies from 13 of the 33 states accounted for 75% of the PFAS detections.

PFAS have very strong chemical stability, and are resistant to degradation which helps explain why the contamination is so widespread. PFAS accumulate in the blood and certain organs of people and animals and remain in the bloodstream for years. The full health-impact of PFAS ingestion is still being studied, but according to the Center for Disease Control, lab studies have linked adverse health effects to growth, development, reproduction, and liver injury.

There are many sources of PFAS. These are man-made chemicals and are not naturally occurring. Their chemical strength - resistance to breakdown and repellant properties - is what makes them useful for such things as stain-resistance, furniture fabrics, food packaging and firefighting foams. It also makes them environmentally resilient. Groundwater near civilian airports, military fire training areas and industrial sites that use aqueous film forming foams (AFFF) are of great concern. PFAS has been found in landfill leachates, and municipal wastewater discharge streams.

Due to the increasing prevalence of the contamination and the significance of its long-lasting effects, the U.S. EPA set a Health Advisory Limit for PFOA and PFOS, at 70 ppt for a combined concentration. This has raised public health awareness and concern. However, the health advisory is non-enforceable and non-regulatory. Many states are enacting their own regulations. The previously mentioned Harvard study estimated 66 water supplies in the U.S. serving 6 million people, were found to have PFOS and PFAS above the EPA Health Advisory Limit.

At Evoqua, we have the expertise to transform the water and enrich the lives of the communities surrounding these contaminated areas. To that end we have multiple proven solutions that remove PFAS from water.

Granular Activated Carbon (GAC)

Granular Activated Carbon (GAC) has a long history of effective PFAS removal. GAC has the added distinction of being recommended by the EPA which has named GAC the 'Best Available Technology' for organic contaminant removal. GAC concurrently captures other regulated organic contaminants such as trichloroethylene (TCE,) total organic carbon (TOC,) and other regulated organic contaminants present in addition to PFAS. Additionally, GAC does not require any onsite chemicals or produce any liquid waste streams.

Evoqua offers three GAC products for PFAS removal: AquaCarb® CX, UltraCarb® 1240LD and UltraCarb® 1240AW. All products have optimized porosity for PFAS removal and can be applied to municipal (ANSI®/NSF® classified for use in potable applications), industrial, and remediation applications. It fully conforms to the physical, performance and leachability requirements established by ANSI/AWWA® B604.

Among its benefits, GAC can be reactivated for reuse. Once the carbon bed is exhausted, it is sent to an Evoqua reactivation facility. After reactivation the carbon is returned to service. In many applications AquaCarb CX will see an improvement in porosity through reactivation, making reactivation highly desirable and sustainable. Our detailed quality assurance program administered by our State-certified laboratory guarantees consistent quality from lot to lot and shipment to shipment.

Single Pass Ion Exchange Resin

Evoqua also offers single pass resin solutions for PFAS removal. As an alternative to GAC, PFAS-selective resins are extremely effective at removing a large range of chain lengths of PFAS and PFAS alternatives. These resins have high selectivity for PFAS chemicals which leads to long bed life. Additionally, resin can run at high flow rates which means it can accommodate small footprint requirements for customers. The resin is not affected as dramatically by TOC levels making performance easier to predict through modelling. This is useful to customers as they estimate lifecycle costs. These factors make resin a cost-effective solution to evaluate.

Like GAC, there is no liquid waste stream. Spent resin is often sent to a waste-to-energy facility for incineration where both the resin and the PFAS contaminants are destroyed.

Evoqua's recommended resin product is PSR2 Plus. This resin has been widely used for over 15 years for perchlorate removal. Treating the majority of both drinking water and remediation perchlorate groundwater contamination sites, this is a tried and true solution for many water purveyors.

Single pass ion exchange is being proven throughout the country for PFAS as well. Multiple locations have adopted this solution including a site in Stratmoor Hills, Colorado. This site has been using Evoqua's PSR2 Plus resin since 2017 to remove PFAS to meet Colorado drinking water standards which are more stringent than the EPA's health advisory.

Summary

Concern over PFAS contamination in community water supplies is quickly rising in the U.S. and around the world. Evoqua is positioned to provide multiple proven solutions to remove PFAS from water sources and produce clean, safe water for communities. Options include initial testing, pilot studies and installation. For GAC and resin solutions we provide turnkey delivery and slurry services as well. Customers find us easy to work with as we provide several clear choices of ownership.

Communities are lowering the detectable levels of PFAS in their water by using treatment systems by Evoqua. We provide case studies that illustrate the benefits and prove the science behind our efforts.

Evoqua Water Technologies continues to invest in GAC, resin, and membrane solutions. For the mitigation of future contamination, we are also developing technologies that destroy PFAS onsite. We understand that every water source is unique and we are confident that we can design a solution to meet a specific need.

EVOQUA WATER TECHNOLOGIES

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