



QUOTE

From: Andrew Mock
To: Domenic Gentilucci Utilities Inc. Area Manager
Loc: Lake Groves WTP Clermont Fl.
Re: Lake Groves WTP Sulfuric Acid System Improvement Project
Date: October 10, 2019 (Revision 2)

Domenic,

Introduction

Odyssey is pleased to quote you for the following work to be performed at the Lake Groves Water Treatment Facility just south of Clermont. As you know your current sulfuric acid system was installed by Odyssey in 2007 and as of December of that year you were still feeding 50% sulfuric acid. For the duration of the systems life it has operated relatively problem free and has actually exceeded its serviceable life. At some point in 2008 you switched to 93% sulfuric acid as the 50% was not adequately lowering the PH for the scrubber. At that time, all the sulfuric acid used in Florida was produced by a few domestic manufacturers all of which produced a very consistent 93% strength. Around 2010 one of the major sulfuric acid suppliers in FL began purchasing sulfuric acid from the local phosphate mines at a lower price per ton and at 98% strength and later on began importing the same strength sulfuric acid from China. The same company invested in a chiller and dilution system and has since been shipping sulfuric acid between 91% and 95% strength. The difficulty lays in that CPVC in 93% sulfuric acid service is at the very limits of its ability. Once a "hot" load of 94% or greater is delivered, the integrity of the pipe is compromised and the acid will literally sweat through the pipe. Based on our experience this issue is most prevalent on 1" or smaller pipe which is what comprises your entire system. Aside from this we have had issues with glue joints as the best chemical grade CPVC glue is only rated for 80% sulfuric acid which is currently not available commercially. Because of all these issues Odyssey no longer recommends CPVC for 93% sulfuric acid use and is unable to warranty it if used. Based on our experience, a CPVC system today in 93% sulfuric acid service will last anywhere from 6 months to a few years. The same system built from PVDF may need minor repairs in 10 years and should still be serviceable for many years afterwards. Even with this it is Odyssey's recommendation that you require a C of A from your sulfuric acid provider with each load and reject any load with a percent strength over 94%, by doing so you will maximize the life expectance of your piping system.

Odyssey currently has several lead technicians each with several years of experience in thermo-welding PVDF pipe. Additionally, we have had all our helpers trained by Asahi in thermo-welding equipment and techniques. Kynar (PVDF) which Odyssey recommends for your sulfuric acid system, was developed by the thermoplastics industry as an answer to handling difficult and/or dangerous chemicals and has become the standard in the industry for sulfuric acid up to 95%. Sulfuric acid at 95% or stronger begins to fume releasing sulfuric trioxide which is highly corrosive and is toxic when inhaled. PVDF is a thermo-welded piping system and is not able to be glued together. Properly assembled, a thermo-welded system is no longer considered pipe and fittings but rather a single continuous unit. Meaning there is no difference in material

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at a joint as there is in a glued connection, everything is the same unified material. Additionally, PVDF has a significantly higher resistance to UV light than PVC/CPVC does making it perfect for outdoor use. It also has a higher impact resistance than PVC/CPVC. Due to the nature of this system threaded joints are minimized and can be eliminated entirely if necessary. Any removable connection may be made with a welded union and sealed with a compressed o-ring or flanged with a gasket. All valves shall be Asahi type 21 true union valves. All O-rings and gaskets shall be Viton. Expansion joints shall have 3 to 5 volutes with the wetted materials being made of PTFE and having flanged connections. If a new injection quill is needed, Odyssey recommends the Safety-Flo Hastelloy-C injector assembly.

Tanks

The existing tanks have been in service since 2007 which is past the anticipated life expectancy. Considering how well they have done Odyssey recommends staying with the same tanks. Snyder has a proprietary curing process for their HDLPE acid resin which allows for this life expectancy. Both tanks shall have a 2" welded flange at the top left side of the tank at 90deg. From the man way for the fill line. The tank shall have a 3" CPVC U-vent and a 1/2" CPVC bulkhead for the Kynar sight-glass to return to. All piping that attaches to the top of the tank shall be done by flange.

Plumbing/Piping Purging and Removal

This phase will include purging of sulfuric acid from the existing feed system and the subsequent removal of all plumbing inside of the sulfuric acid feed equipment room all the way back to the tanks and to the injection point. Odyssey will also clean/neutralize any spilled chemical in the chemical room/work area. Prior to the piping removal, Odyssey will flush all lines into their respective injection location with air followed by potable water from the eyewash or spigot. Once the system is purged, Odyssey will proceed in the old piping's removal and disposal.

System Reconstruction

Odyssey shall transfer the content of tank 1 over to tank 2 and remove the tank. Once it is out of the way Odyssey shall install the new tank and add the bottom valve. once this is done the sulfuric acid can be transferred to the new tank and put back on line using temporary PFA tubing. Once tank 1 is empty it will be pulled and the new tank installed. Once the tanks are in the new double wall 2" x 1/2" suction can be ran over to the new chemical building area.

At this point Odyssey will proceed to re-pipe the Chemical feed room from the suction of the bulk tanks all the way to the injection point in the vault just to the south east corner of the chemical building. During this process, Odyssey will strive to streamline the system to make it as user friendly as possible. All piping within the room will be single wall pipe. Odyssey will then proceed to re-pipe the sulfuric acid injection line from the building to the vault. Considering the hazards of sulfuric acid before the piping goes into the ground Odyssey will transition to double-wall PVDF inside CPVC pipe (2" x 1/2") and will transition back once it enters the vault. The feed system will include one back pressure valve (BPV), two pressure relief valves (PRV), a pressure gauge, a calibration column, a Y pattern strainer with isolation, and all other isolation valves necessary for a safe system (12- 1/2" and 2-1"). The vent off the calibration column will be ran back to the nearest bulk tank as well. The injection point will include a primary chemical injection isolation valve, a diaphragm check valve, and a secondary isolation valve so the check valve can be maintained safely.

Roof

Odyssey proposes to build a 4ft x 4ft roof over the pump system to provide shelter and shade to the pump system. The roof will have a pitch of 0.667 or 6 inches over 4ft. the roof will slope from the east to the west allowing maximum head space for pump maintenance. The west side will be 6.5ft high the east side will be 7ft. each 4x4 PT post shall be either buried a minimum of 24in into the ground or anchored to the slab. Each post will also have anchors tying each post into the slab. The roof frame shall be made from 2x6 PT lumber anchored to each post with 2x4 PT rafters every 24in in between. The roof itself will be corrugated galvanized steel. For added protection Odyssey shall build walls which will extend down from the roof to the ground. These walls will be made of composite deck boards, providing the maximum reinforcement to

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the roof structure, and will never need painting. These walls will be on the south, west, and north sides to add additional shade. The new structure can be built around the existing shed ahead of its removal, this will allow for plumbing and electrical to be ran ahead of taking anything off line for too long.

Electrical

Odyssey shall install a new outlet and light in the new enclosure area once the structure is up. The vent fan will no longer be necessary because the front of the building is open. All the conduit and boxes shall be PVC. This portion of the work can be done in a day once the roof is up.

I would recommend modifying the existing vault to prevent sand from coming in from the top if possible and to excavate the bottom to below the pipe, install a ground cloth, and fill the vault back up to the top of the pipe with lime rock as this is the natural neutralizer for sulfuric acid. This way if there is ever a minor leak it will be neutralized before it gets to the ground.

(2) Snyder 2000-gallon Captor tanks with cured resin for sulfuric acid	\$21,750
Shipping and handling for tanks	\$ 2,000
Old tank disposal \$1,000 ea.	\$ 2,000
Equipment- Lull and Air Diaphragm Transfer Pump	\$ 1,200
PVDF Asahi type 21 ball valves with Viton O-rings ½” – 2”	\$ 3,250
PVDF BPV and PRV	\$ 1,950
Lot- PVDF pipe and fittings ½” suction and discharge	\$ 2,650
Lot- PVDF Pipe and fittings 2” fill line	\$ 5,085
Lot- CPVC containment pipe	\$ 250
Ancillary Equipment- calibration column, pressure gauge etc.	\$ 850
Misc. Pipe Straps, Anchors, Consumables	\$ 200
The EMEC Pump AUO 03040 K 98 03, 10.5 GPH, 43 PSI, PVDF+FP.	\$ 1,025
Roof and wall Materials	\$ 2,600
Electrical Materials	\$ 250
(32hrs) Labor Tech @ \$85 per Hr.	\$ 2720
(8hrs) Labor Electrician @ \$85 per Hr.	\$ 680
(10hrs) Labor Equipment Operator @ \$85 per Hr.	\$ 850
(32hrs) Labor Helper @ \$45 per Hr.	\$ 1,440
<hr/> Total	\$50,750
Tax 7%	\$ 3,552.50
<hr/> Grand Total	<hr/> \$54,302.50

Thank you for your consideration. Andrew

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