

2024 AGENDA ITEM

Utility Commission Meeting Date: 8/15/2024

ITEM: Substation #4 Transformer – Low Side Bushing Replacement and Transformer Oil Report

DETAILED DESCRIPTION OF SUBJECT MATTER:

The items of Unfinished Business date back to the Immediate Repairs of Substation #4 due to Animal Contact. After the initial inspection and repairs were performed oil/gas was tested from the transformer and as you can see from the documentation no damage to the internals of the transformer occurred. However, it was recommended that all 4 of the lower bushings be replaced for an additional **\$29,657.88**. These repairs will bring the substation back into service and fully functional. Repair parts have a procurement time of 12-18 weeks. This work will be done prior to the Transruptor Project on Substation #3. At the current time Substation #4 is Out of Service, BUT in the event of an emergency it can be placed online to support the electrical requirements of the hospital.

It is the recommendation of the Director to approve the additional funding and repair work.

LIST ALL SUPPORTING DOCUMENTATION ATTACHED:

1. Email Communication
2. Oil Report
3. Bushing Quote from Hubbell

ACTION REQUESTED OF COMMISSION:

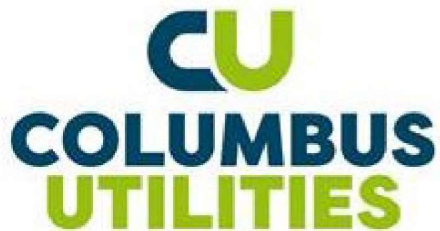
Discussion and Approval of Directors Recommendation.

From: [Dalton Hiley](#)
To: [Jacob Holbert](#)
Cc: [Michelle Kaltenberg](#)
Subject: FW: Sub 4 Tx bushings
Date: Wednesday, July 31, 2024 6:51:29 AM
Attachments: [image001.png](#)
[Hubbell quote.PDF](#)
[34207 oil.pdf](#)

See below conversation between Jason and I. As he stated below either company makes a quality bushing also the oil sample was good. Jacob let me know if you need anything else from me to give to the commission.

PLEASE NOTE MY EMAIL HAS CHANGED TO: Dhiley@columbusutilitieswi.com

Dalton Hiley
Lead Lineman
Columbus Utilities
950 Maple Avenue, PO Box 228
Columbus, WI 53925
920-623-5912 – Office
920-344-4317- Cell



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From: Jason Lemke <jason@acengineer.com>
Sent: Tuesday, July 30, 2024 5:43 PM
To: Dalton Hiley <dhiley@columbusutilitieswi.com>
Cc: Bruce Beth <bbeth@forstereng.com>
Subject: Re: Sub 4 Tx bushings

Dalton,

Attached is an updated quotation for the Hubbell bushings showing the quantity as 4 and w/o tax added. Also attached are the test results from the oil/dissolved gas sample I took while onsite; everything looks good on the test results with no sign of any internal damage to the transformer.

Sincerely,

Jason Lemke
A. C. Engineering Company
262-547-2006

From: Jason Lemke <jason@acengineer.com>
Sent: Monday, July 29, 2024 4:24 PM
To: Dalton Hiley <dhiley@columbusutilitieswi.com>
Subject: Re: Sub 4 Tx bushings

Hey Dalton,

Either brand makes a good reliable bushing; I usually buy the Hitachi bushings, but those were more expensive in this case. I don't see any reason to spend the extra money for the Hitachi over the Hubbell.

As far as quantity it would be better to replace all 4 low side bushings; the quantities shown on the quotes along with the sales tax don't really matter since I would place the order for the correct quantity and w/o sales tax anyway (the quotes are for A. C. Engineering purchasing the bushings; we don't markup parts so I would charge you whatever they bill me). If you'd like me to have the Hubbell quotation updated so you can present it to the commission that is no problem; I'll ask for an updated quotation and send it over.

Sincerely,

Jason Lemke
A. C. Engineering Company
262-547-2006

From: Dalton Hiley <dhiley@columbusutilitieswi.com>
Sent: Monday, July 29, 2024 3:57 PM
To: Jason Lemke <jason@acengineer.com>
Subject: RE: Sub 4 Tx bushings

Jason,

Just a couple questions before moving forward, is there a brand you would recommend over the other, Hitachi or Hubbell? I see the border states quote includes sales tax, we have a tax exempt ID so we shouldn't have to worry about that I believe. Also, I see a quantity of 3 on the border states quote, should that be 4? It was my understanding we are changing all 4 of the low side bushings? If that is true could you please reach out and get updated quotes to reflect proper quantity and no sales tax? I only ask because I will have to take this to the commission and want the price to be accurately reflected.

Thanks for the help,

PLEASE NOTE MY EMAIL HAS CHANGED TO: Dhiley@columbusutilitieswi.com

Dalton Hiley

Lead Lineman

Columbus Utilities

950 Maple Avenue, PO Box 228

Columbus, WI 53925

920-623-5912 - Office

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From: Jason Lemke <jason@acengineer.com>

Sent: Monday, July 29, 2024 1:42 PM

To: Dalton Hiley <dhiley@columbusutilitieswi.com>

Cc: Bruce Beth <bbeth@forstereng.com>; Justin Franz <jfranz@forstereng.com>

Subject: Sub 4 Tx bushings

Dalton,

First off, I've ordered the parts needed to install the primary bushings obtained from Mt Horeb into the transformer at Sub 4. As soon as I receive any info on a delivery date, I will let you know. Two, I've attached the two quotations I've received for the replacement transformer secondary bushings for Sub 4. Both Hitachi (formerly ABB), and Hubbell are more expensive than I expected; part of this is the ampacity of the existing bushings (2,000A) and the other I'm guessing may be in trying to replicate (maybe an odd size bushing?) a replacement for the existing Chinese bushings. Whatever the reasoning behind the high prices, I'm not sure there's much choice since the secondary bushings need to be replaced...

I've also attached info on the two replacement bushings and included Forster on this email so they can review and provide any comments/direction moving forward.

Sincerely,

Jason Lemke

A. C. Engineering Company

262-547-2006

TEST RESULTS

Alternative Technologies, Inc.

12350 River Ridge Blvd.

Burnsville, MN 55337

Telephone (800) 255-8656 or (952) 894-3455

Type / Tank: TRN
KVA: 14000
Voltage: 67000
Gallons: 2120
Manuf Date: 8/06
Fluid Type: Mineral Oil

A.C. Engineering Company
N16 W 22040 Jericho Drive #1
Waukesha, WI 53186-1169

Location: COLUMBUS 4
Bank & Phase: TRN
Manufacturer: VIRGINIA
Container No.: AT272

Serial Number:	47010MA147-A870A
Client Number:	34207
Date Received:	7-22-2024
Report Date:	7-30-2024

DISSOLVED GAS IN OIL ANALYSIS

Date Temp	18-Jul-24	03-May-23	04-May-22	11-May-21	21-Apr-20	17-Apr-19	
	15C	20C	20C	20C	20C	20C	
Hydrogen (H2)	6	7	3	4	4	3	ppm
Methane (CH4)	4	3	3	3	3	2	ppm
Ethane (C2H6)	1	1	1	1	1	1	ppm
Ethylene (C2H4)	2	2	2	2	1	2	ppm
Acetylene (C2H2)	0	0	0	0	0	0	ppm
Carbon Monoxide (CO)	171	139	117	126	124	89	ppm
Carbon Dioxide (CO2)	5013	3841	3572	4113	3109	3381	ppm
Nitrogen (N2)	86011	76928	73051	84531	88662	80579	ppm
Oxygen (O2)	4065	4174	4344	3934	4249	5840	ppm
Total Gas	95273	85095	81093	92714	96153	89897	ppm
Total Combustible Gas	184	152	126	136	133	97	ppm
Equivalent TCG Reading	0.1531	0.1433	0.1203	0.1148	0.1073	0.0839	%

Comments: All gases at acceptable concentrations

Recommended Retest: 1 Year

PHYSICAL AND CHEMICAL TESTS

Date:	18-Jul-24	03-May-23	04-May-22	11-May-21	21-Apr-20	17-Apr-19	
Moisture in Oil	14	10	8	7	7	2	ppm
Interfacial Tension	39.0	40.7	38.1	39.3	40.1	40.4	dynes/cm
Acid Number	<.010	<.010	<.010	<.010	<.010	0.012	mg KOH/g
Color Number	0.5	0.5	0.5	0.5	0.5	0.5	relative
Visual	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	
Dielectric D877	53	54	42	48	51	52	kV
Viscosity		61.0	60.7	60.9	60.9	60.9	SUS
Specific Gravity	0.880	0.880	0.878	0.880	0.880	0.880	relative
Power Factor @ 25C	<.05	<.05	<.05	<.05	<.05	<.05	%
Power Factor @ 100C		0.24	0.15	0.20	0.17	0.29	%
Oxidation Inhibitor		0.29	0.26	0.26	0.27	0.28	%
Fural Screen							
Pour Point							
Flash Point							

PCB CONTENT		METALS IN OIL (ppm)							
PPM	Aroclor	Date	Aluminum	Copper	Iron	Lead	Silver	Tin	Zinc
		7/18/24							
		5/3/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
		5/4/22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Alternative Technologies, Inc., (ATI) shall assume no liability or responsibility, nor imply or express any warranty or other security against client loss of production, operation, profitability, or other loss, regardless of circumstances, beyond the cost of re-analysis by ATI.

Approved By: _____

Lab Number:	241696-001
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Quote

Page: 1 of 1

Border States - PWK
N29W23606 Woodgate Ct E
Pewaukee WI 53072-6248
Phone: 262-347-2199

Quote: 27606206
Sold-To Acct #: 35646
Valid From: 07/23/2024 To: 08/16/2024
PO No: JASON LEMKE
PO Date: 07/23/2024
Payment Terms: 1% DISCT PROX 25 DUE PROX NET

Created By: John R Carey
Tel No: 262-347-2107
Fax No:

AC ENGINEERING COMPANY
N16W22040 JERICHO DR
WAUKESHA WI 53186-1169

Inco Terms:
FOB ORIGIN PREPAID AND ADD

Ship-to:
AC ENGINEERING COMPANY
N16W22040 JERICHO DR
WAUKESHA WI 53186-1169

Order Note:
NOTES FROM ELECTRO COMPOSITES / HUBBELL:

Our proposed bushing is shorter above flange and is slightly larger in diameter below flange. For the length, they may need to extend the bus to accommodate. As for the diameter, there should be no issue with the tank opening but the CT diameter should be verified. Lastly, the bottom spade is in a different orientation from the drawing. They can confirm if there is flexibility in the connection internally. If not, I can modify this to match.

Cust Item	Item	Material MFG - Description	Quantity	Price Per	UoM	Value
	000010	- 150-020-T-1091-00 BUSHING 25KV 2,000A * SHIPS APPROX. 10-12 WEEKS ARO* 1091 SDC BUSHING 25KV 2,000A (CUST MATL: LI PING 60203)	4 EA	7,414.47 / 1	EA	29,657.88
Total \$						29,657.88
State Tax \$ 0.000 % 0.00						
County Tax \$ 0.000 % 0.00						
Local Tax \$ 0.000 % 0.00						
Other Tax1 \$ 0.000 % 0.00						
Other Tax2 \$ 0.000 % 0.00						
Other Tax3 \$ 0.000 % 0.00						
Tax Subtotal \$ 0.000 % 0.00						0.00
Net Amount \$						29,657.88

To access Border States Terms and Conditions of Sale, please go to
<https://www.borderstates.com>

The quoted sales tax is an estimate only based upon the information provided in this quote and will be finalized at the time of Invoice based upon the material purchased, quantity purchased, and delivery location.

Shipping and handling fees in this quote are an estimate only and will be finalized at the time of Invoice.

All clerical errors contained herein are subject to correction. In the event of any cost or price increases from manufacturers or other suppliers, caused by, but not limited to, currency fluctuations, raw material or labor prices, fuel or transportation cost increases, and any import tariffs, taxes, fees, or surcharges, Border States reserves the exclusive right to change its pricing at the time of shipping and will provide notice of any such change to its customers prior to costs being incurred.