BEFORE THE WASHINGTON UTILITIES & TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,

Complainant,

v.

AVISTA CORPORATION d/b/a AVISTA UTILITIES,

Respondent.

DOCKET NOS. UE-200900 and UG-200901 (Consolidated)

PAUL J. ALVAREZ AND DENNIS STEPHENS

ON BEHALF OF THE WASHINGTON STATE OFFICE OF THE ATTORNEY GENERAL PUBLIC COUNSEL UNIT

EXHIBIT PADS-20

Avista Response to Public Counsel Data Request No. 215, Attachment A

April 21, 2021

AVISTA CORP. RESPONSE TO REQUEST FOR INFORMATION

JURISDICTION: WASHINGTON DATE PREPARED: 03/05/2021

CASE NO.: UE-200900 & UG-200901 WITNESS: Heather Rosentrater REQUESTER: Public Counsel RESPONDER: Glenn Madden

TYPE: Data Request DEPT: Substation Engineering

REQUEST NO.: PC - 215 TELEPHONE: (509) 495-2146

EMAIL: glenn.madden@avistacorp.com

SUBJECT: Capital Additions, Test Year (Electric)

REQUEST:

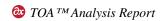
Please refer to Avista's Response to Public Counsel Data Request No. 101 and to Attachment E (Colville Transformer No. 2 Replacement) provided.

- a) Provide the cost to replace Colville Transformer No. 2.
- b) Provide the age of the oldest transformer currently operating on the Avista system.
- c) Provide the age at replacement of the oldest transformer Avista has ever replaced on its system.
- d) Provide a count of transformers currently operating on the Avista system for which oil is observable on the outside of the transformer. If this count is not available, estimate the percentage of transformers currently operating on the Avista system for which oil is observable on the outside of the transformer.
- e) Provide any internal standard, inspection guide, test, or other document which indicates the amount of observable oil which justifies a transformer replacement.
- f) Provide all business cases, worksheets, workbooks, models, cost-benefit analyses, or any other calculations, presentations, requests, standards, other documentation, or industry publications which indicate that oil observed on the outside of a transformer justifies replacement.
- g) Has Avista had transformers operate safely and reliably for many years with oil observed on the outside of that transformer?
- h) Explain why Avista would not just change out the under-rated switch gear for Colville Transformer No. 2.
- i) Provide the most recent Dissolved Gas Analysis (DGA) for Colville Transformer No. 2 (or, alternatively, the last DGA completed on Colville Transformer # 2 prior to replacement).
- j) In the event the Colville Transformer No. 2 fails, describe the actions Avista will take to mitigate customer impact (meaning, the prescribed N-1 action).

RESPONSE:

- a) Total cost for the Colville Transformer #2 replacement project was \$ 680,524.
- b) The oldest transformer (Equipment Type: Power Transformer) currently operating on the Avista system is 75 years.
- c) The oldest transformer replaced, using current Asset Management (Maximo) information, was 81 years.
- d) Avista estimates the percentage of transformers currently operating for which oil is observable outside of the transformer to be 15%.

- e) Avista considers many factors when determining the need to replace a transformer based on asset condition, which include, but are not limited to, asset health data, environmental considerations, age, visual inspection, and operating history. PC-DR-101 Attachment E lists the various drivers for this project.
- f) See Part (e).
- g) Please see part (d) above.
- h) Avista evaluates the issues, needs and ultimate scope for each project, and identifies appropriate actions based on the number, range and severity of problems identified. Had the only problem with the subject transformer been identified as an under-rated circuit switcher, then Avista would have limited the project scope to solve that problem. Clearly, that was not the case.
- i) See Pd-DR-215 Attachment A "CLV T2 5067947 TOA Analysis Report".
- j) In the event of a transformer failure Avista would have taken advantage of all available options to pick up load with adjacent equipment and feeders (here the need for available equipment capacity and loadings as described in PC-DR-211). Once those options were fully optimized Avista would either install a mobile transformer and/or replace the transformer as quickly as possible.



Equipment	5067947	Cooling	FA
Serial No.	5067947	Fluid volume	4941
Apparatus type	TRN	External ID	10112815
Owner	Retired	In service	False
Region	Retired	Equipment remarks	Sudden Pressure Relay, Retired 2018
Substation	Colville 115/13kV	Tank	MAIN
Designation	TRANSF #2	Norms used	TRN_IEEE_69_288KV
Norms	TRN_IEEE_69_288KV	Gassing status	3
Fluid type	OIL	DGA result	1/1
Description	Distribution Substation	Moisture result	2/1
Manufacturer	WEST	FQ result	2/2
Year manufactured	1951	PCB result	0/0
MVA ratings	12	Oil test status	REVIEWED
Max rated voltage	115	Reviewer	RHAWKINS

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Dissolved Gas Analysis

Lab Report Number	205617-030	194149-018	190562-003	182819-001	182061-003	
Sample date	2018-04-11	2016-05-23	2015-10-02	2014-07-15	2014-05-30	
Sample temp	30	35	30	60	30	°C
Hydrogen (H2)	8	68	76	256*	353*^!	μL/L
Methane (CH4)	7.0	5.0	5.0	3.0	12.0	μL/L
Ethane (C2H6)	5.0	4.0	5.0	4.0	6.0	μL/L
Ethylene (C2H4)	23.0	25.0	29.0	20.0	29.0	μL/L
Acetylene (C2H2)	0.0	0.0	0.0	0.0	0.0	μL/L
Carbon Monoxide (CO)	180~	103	71	57	98	μL/L
Carbon Dioxide (CO2)	2209	2457	2880	2835	4034	μL/L
Oxygen (O2)	2139	7183	2005	7923	1442	μL/L
Nitrogen (N2)	78484	78109	89105	80757	84978	μL/L
Total heat gas	35	34	39	27	47	μL/L
TDCG	223	205	186	340	498	μL/L
Equivalent TCG	0.185	0.234	0.204	0.519	0.782	%
Total partial press	88.0	88.8	99.7	84.5	95.5	% atm
Est. safe handling limit	10.0	5.4	4.9	4.3	4.3	%
Predicted composite fault gas	41	87	89	267	371	μL/L
Acetylene/Hydrogen (C2H2/H2)	0.0					
CO2/CO	12.272	23.854	40.563	49.737	41.163	
CO/CO2	0.081	0.042	0.025	0.020	0.024	
Oxygen/Nitrogen (O2/N2)	0.027	0.092	0.023	0.098	0.017	
NEI-HC	0.15	0.15				kJ/kL
NEI-CO	3.79					kJ/kL
DGA retest days		730	365	365	90	days
DGA retest date		2018-05-23	2016-10-02	2015-07-15	2014-08-30	
DGA reference days	688.0	234.0	444.0	46.0	395.0	days
DGA result	1	1	1	2	3	
DGA diagnosis				H2	Т3	

Symbol legend: !: sharp jump, *: abnormal level, ^: abnormal increment, ~: below min interpretation level

Dissolved Gas Analysis Remarks

No anomalies.

Dissolved Gas Analysis Summary

Variable name	Value	Units	Description
Carbon Monoxide (CO)	180~	μL/L	



co~

Moisture Analysis

Lab Report Number	205617-030	194149-018	190562-003	182819-001	182061-003	
Sample date	2018-04-11	2016-05-23	2015-10-02	2014-07-15	2014-05-30	
Sample temp	30	35	30	60	30	°C
Moisture	16	27*	7	44*	34*	mg/kg
Relative saturation	19	26*	8	17	41*	%
Dew point	-6	5	-21	15	9	°C
Moisture result	1	2	1	2	2	
Moisture diagnosis		WET-OIL		WET-OIL	WET-OIL	

Symbol legend: *: abnormal level

Moisture Remarks

The water content of the oil is acceptable.

Fluid Quality

Lab Report Number	205617-030	194149-018	190562-003	182819-001	182061-003	
Sample date	2018-04-11	2016-05-23	2015-10-02	2014-07-15	2014-05-30	
Sample temp	30	35	30	60	30	°C
Diel breakdown D877	45.0*	45.0*	48.0*	31.0*	39.0*	kV
Acid number	0.012	0.012	0.012	0.018	0.024	mg KOH/g
Interfacial tension	33.6	33.5	32.6	32.7	32.8	mN/m
Specific Gravity	0.870	0.871	0.871	0.874	0.872	
Color	2.0	2.0	2.0	2.0	2.0	
Oil quality index	0.4	0.4	0.4	0.6	0.7	
Visual	OK	DEBRIS	CLEAR	SEDIMENT	OK	
Fluid quality retest days		730	365	365	90	days
Fluid quality retest date		2018-05-23	2016-10-02	2015-07-15	2014-08-30	
FQ result	2	2	2	2	2	

Symbol legend: *: abnormal level

Fluid Quality Summary

Variable name	Value	Units	Description
Diel breakdown D877	45.0*	kV	Level alert (high 26, low 18).



d877*

History Graphs and Diagnostic Charts

