WUTC DOCKET: UE-200900 UG-200901 UE-200894
EXHIBIT: PADS-12
ADMIT ☑ W/D ☐ REJECT ☐

**BEFORE THE WASHINGTON**

**UTILITIES & TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,

Complainant,

v.

AVISTA CORPORATION d/b/a AVISTA UTILITIES,

Respondent.

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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**

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**EXHIBIT PADS-12**

Avista Response to Public Counsel Data Request No. 307

**April 21, 2021**

**AVISTA CORP.**
**RESPONSE TO REQUEST FOR INFORMATION**

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|---|---|---|---|
| JURISDICTION: | WASHINGTON | DATE PREPARED: | 04/07/2021 |
| CASE NO.: | UE-200900 & UG-200901 | WITNESS: | Heather Rosentrater |
| REQUESTER: | Public Counsel | RESPONDER: | Glenn Madden |
| TYPE: | Data Request | DEPT: | Substation Engineering |
| REQUEST NO.: | PC - 307 | TELEPHONE: | (509) 495-2146 |
| | | EMAIL: | glenn.madden@avistacorp.com |

**SUBJECT: Substation Equipment**

**REQUEST:**

**Please refer to Attachment A, “LVCB Oil LCA transmittal 022719.pdf”, provided by Avista in response to Public Counsel Data Request No. 209.**

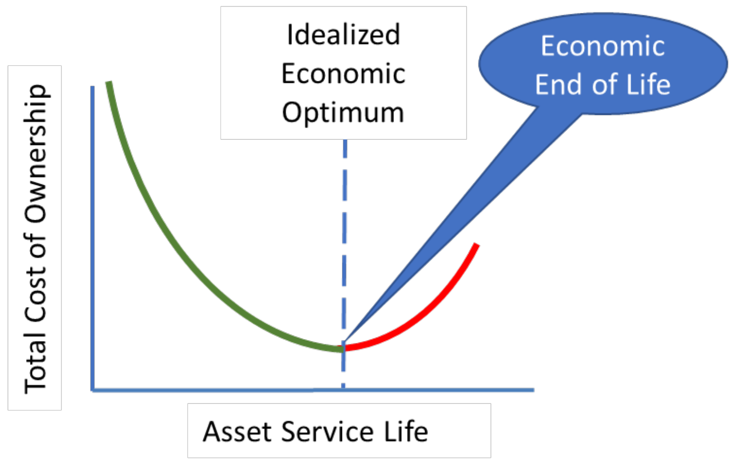
Please refer to the box in the right-hand column on page 1, which references three different equipment age measures: (1) “Economic Optimum” (38 years); “RTF” (30 years); and “ETA” (52.3 years).

a) Provide a definition for each of these three types of equipment age measures. In each definition, describe what each age measure is intended to represent.

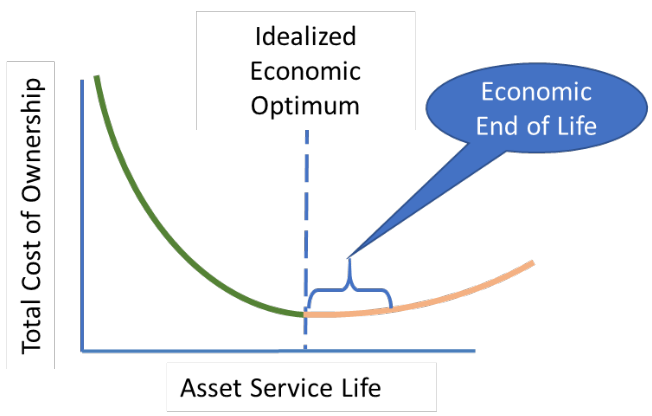
b) Identify which age measure Avista considers to be representative of the age at which the equipment in question should be replaced such that the benefits to customers of preemptive replacement exceed the cost to customers of preemptive replacement.

**RESPONSE:**

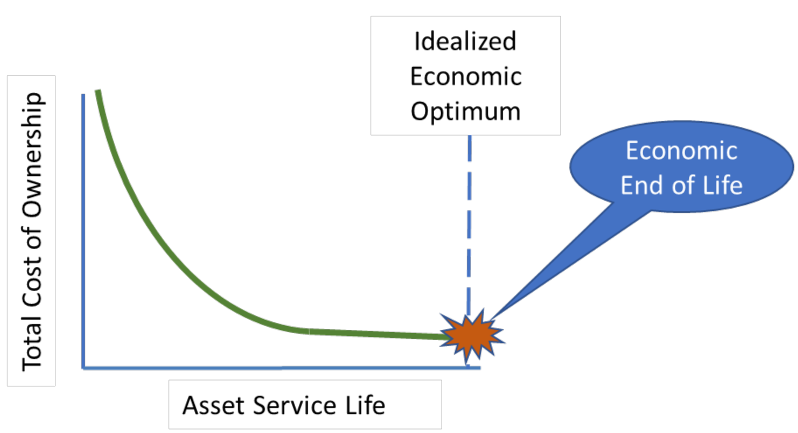
a) **Economic Optimum** is the idealized point of the lowest total cost of ownership for an asset. Total cost of ownership includes the initial investment, maintenance and replacement costs, as well as risk costs associated with operation and failure in service (e.g. outage risk, safety risk, environmental risk, among others). In the illustrative example, below, replacing the asset much prior to the economic optimum will not capture the full value of the initial investment, while replacing it much beyond the economic optimum will result in the encumbrance of uneconomic costs for maintenance or failure, as noted above. Replacement either too early or too late in this idealized example costs customers more money than targeting the economic optimum. Because the costs beyond the optimum are substantial, and the optimum is fairly narrow, this illustration might represent an asset that you target for replacement at the end of its useful life, which is defined by its Economic end of Life, but while the asset is in service.




In the next illustration, below, while there is still an idealized economic optimum, the more-moderate accumulation of costs and risks beyond the optimum (compared with the illustration, above) provides the financial opportunity to keep the asset in service beyond the economic optimum. In this case, the financial consequences of capturing a few more years' service, including its possible failure in service, may not add substantially to the total cost of ownership.




Finally, the illustration, below, represents the lifecycle costs for an asset whose end of useful life would be defined by 'when it fails in service.' The failure in service for such an asset represents the economic optimum because the consequence costs for keeping the equipment in service are generally lower than the cost of replacing it while still in service.



**ETA** - The point referred to as the "Eta" value or line, which was described by Avista in response to PC-DR-296 part (a), is a Weibull Curve function that represents the point in time at which 63.2% of an asset population of the same age will have failed. This value is derived as the point in which the probability of failure for the population has reached 50%. As noted in response to PC-DR-308, the Eta value, considered in isolation, is not particularly useful for understanding the ultimate failure characteristics for an asset.

**30 years - RTF** – The Availability Workbench model calculated 5% band in total cost of ownership centered on the economic optimum in this case of 38 years. This function represents the flatness (or steepness) of the total cost curve. In this case, while there is an economic optimum time of replacement at 38 years, the asset could be replaced, as appropriate, anytime between 30 and 50 years at a potential incremental cost of 5 percent beyond the economic optimum.

b) Avista, as noted elsewhere, does not 'preemptively' replace equipment; rather, as we have explained and supported, we replace equipment when it should be replaced - at the end of its useful service life - defined typically as the "Economic End of Life" – depicted in the illustrations provided in part (a), above. Accordingly, Avista replaces some assets well before they might fail in service, some around an optimum age or based on condition (which may have broad discretion or leeway depending on factors noted above), and many others, typically, when they fail in service. In each of these instances, the assets are replaced at a time, and in a manner that delivers our customers the reasonably optimized lowest cost of ownership.

Importantly, as noted in the Company's response to PC-DR-296 part (a), and in PC-DR-308, these designations of run to fail or not run to fail, are not necessarily static for each asset. This is because the consequences of a failure in service for an asset may be different depending on its application and location in our system. Using substation equipment as an example discussed in PC-DR-308, the outage consequences of the failure of certain equipment are often minimal in urban substations, because service to customers can be quickly restored by switching among interconnected substations and feeders. By contrast, for our radial rural substations, the failure of the same equipment will result in an outage for a large number of customers, and often a lengthy one, because there are no other facilities to pick them up. Likewise, the costs of replacement are not static. As an example of the latter, it would not be cost effective to send crews across our system solely to locate and replace distribution transformers based on a given age or condition of the units. But it is cost effective to replace transformers based on a given age (and condition) of the units when a crew is already performing work on the pole where such a transformer is located.

The other perspective that is distorted and lost in the discussion focused on each single asset in isolation, is the simple fact that most of our individual assets function together with other assets in assemblies or units of construction, which significantly blurs the lines of the differing asset lives, lifecycle costs, economic optima, and install dates and ages. This can be a particular issue for substations where the notion of being able to replace each single piece of equipment, at its unique economic optimum, reaches a point where the overall customer value is lost by the multiple mobilizations and outages required to perform such work. As demonstrated in the example of power transformers in PC-DR-308, it makes greater financial sense for customers to inspect, refurbish or replace related equipment at one time, even though that time may represent the economic optimum for only a portion of the assets treated. In a related example, Avista has found that replacing a transformer based on age and condition, as part of its wood pole management program, is financially viable, in part, because as part of the transformer replacement, we're also inspecting and replacing as needed the cutout, lightning arrester, high and low-side connectors and wildlife guard, and capturing the energy efficiency savings provided by a new replacement transformer. The lifecycle costs analyzed in the Availability Workbench model take all of this into account in calculating the financial value associated with the transformer replacement (avoidance of the risk costs associated with a failure in service for the transformer, cutout, arrester, high and low-side connectors, etc.; combined with the gain in energy efficiency; combined with the lower cost to install when other capital work is already being performed on that pole). In this instance, and as explained in PC-DR-295 and elsewhere, results of our lifecycle cost modeling demonstrate that replacement of a transformer and the attached equipment in the manner just described provides our customers a lower total cost of ownership, when compared financially with the alternative of allowing the transformer (and attached equipment) to fail in service. None of this financial value for customers can be captured if the individual assets are analyzed and managed in isolation from the other closely allied assets that are part of the assembly.