Proposal for Water Rate Analysis for the Northern Arapaho Nation, by Subcontract to Argonne National Laboratories

Purpose and Need

This proposal describes the need, responsibilities, timing, investment and other issues for rate analysis (later referred to as the "analysis") of the water utility for the Northern Arapaho Nation, near Riverton, Wyoming (later referred to as "the Nation").

This analysis will be performed by GettingGreatRates.com (later referred to as "I"), by subcontract to Argonne National Laboratories (later referred to as Argonne).

The Nation's utility is undergoing remarkable changes and it is starting with almost no metered or paying customers. In some respects, this will be like starting up a new utility, especially concerning rates. The services proposed are intended to support the Nation as it moves it's rates in the direction of adequate and fairly structured. I will try to help them improve the utilities rates and finances rapidly.

Summary

At its simplest, the proposal means this: We will endeavor to satisfy Argonne, and the Nation, with our work in determining rates and fees that are adequate and fairly structured, given the circumstances. If a different structure or level of rates is desired, and that is likely, we will determine those rates, too.

Expected Results

With completion of the analysis:

1. The Nation will discover at what level the utility needs to be funded to accomplish needed system development, refurbishment, repair, maintenance and operation.
2. The Nation will have the "proof" needed to convince council members, ratepayers and others why rates and fees should be set as modeled.
3. The Nation will have the "proof" needed to show funding agencies and the lending market why it deserves the grants, loans and loan terms desired.
4. The Nation will have the wherewithal to successfully comply with health and environmental protection requirements of the regulatory agencies.

Firm Revenues, Qualifications and References

One-hundred percent of the firm's revenues come from rate analysis and related work. Visit gettinggreatrates.com/ggr/freebies/ReferenceList.pdf, or see the attached for detailed qualifications and references. The list includes all rate analysis clients since 2013. GettingGreatRates.com has one office in Jefferson City, Missouri but we operate nation-wide.

Carl Brown, President, will perform all analysis work for this project. He has been doing rate analysis work since 1993. For most of that time he has also been teaching practitioners all over the U.S. on rate analysis and rate setting, writing the rate setting book called, "How to Get Great Rates" and designing rate analysis software.

Jacki Hicks, the firm's Vice-president, will likely assist in the analysis by doing data testing and data input. Ms. Hicks prepares analysis models, especially those for analyses that require databases. Ms. Hicks has approximately 23 years of experience in accounting, financial assurance and complex spreadsheet and database design. Seven of those years have been devoted to utility rate analysis.

GettingGreatRates.com serves as the (only) rate analyst for the Wyoming RATES Program https://gettinggreatrates.com/consulting/WyRATES.pdf. Wyoming Association of Rural Water Systems (WARWS) member systems qualify for a 25 percent discount on all fees. The Association verified to me that the Nation is a member of WARWS, therefore, this project will qualify for the discount.

Form of Agreement

This proposal and Argonne's acceptance (probably by e-mail message) is all the agreement I need. Nearly all my clients acquire my services this way. However, if Argonne prefers to prepare a contract, that is acceptable, too.

Guarantee

If Argonne or the Nation is not satisfied with our work, don't pay us.

Details: If Argonne is unsatisfied with our work, simply tell me about it. I will do my best to make it right. If I still am not able to satisfy Argonne, notify me by mail or e-mail. I will cease the services in question at that point, Argonne will owe me nothing for those services and I will refund any payments already made for those services.

This has been my guarantee policy from the day the company was formed. No client, out of 293 analyses so far, has invoked this guarantee to date and I don't plan to have Argonne, or the Nation, be the first.

Additionally, GettingGreatRates.com carries liability insurance and can name Argonne as an additional insured. (To date, no client has made a claim against our insurance.) Insurance coverage includes:

- Professional liability through United States Liability Insurance Company, $1,000,000, policy number CX 1552729B,
- An auto and personal liability umbrella through American Family Insurance, $1,000,000, policy number 24-UD1380-01.

Scope of Services and Likely Timing of the Project

Many of the Nation's utility and rate issues are unsettled at this time. There could be significant changes, even during the span of this project.

Full rate analysis typically results in metered rates that include a minimum charge and unit charges for the volume of water used by each customer. The utility currently has only a few metered customers. Fortunately, those are the largest ones. The utility is not likely to add any, or many new meters during the span of the rate analysis project. In addition, the utility is not certain of the number of unmetered customers it has or how much volume those customers use.

Full rate analysis also depends upon availability of customer data and system data, including financial, operational, system repair and replacement and system improvement needs data. Most of this data involves system costs and how those costs will get paid. With few paid customers and many unknowns, much of this data will be developed in the course of the analysis.

I will use that data and information to develop a "starter" set of rates. That set of rates will likely continue, but restructure, metered rates for those few customers that currently pay metered rates. It will likely include calculating a set of flat rates or equivalent residential unit (ERU) rates that will not be directly related to volume of water used.

Beyond the "starter" rates, depending upon how fast the utility makes changes to facilities, how fact it picks up new customers and the like, I may be able to model rate changes to take those things into account. If such changes do not materialize rapidly, but the utility wants me to, I can develop "what-if" scenarios that make assumptions about how facilities, finances and customer changes are likely to occur and develop rates that take those things into account. Thus, as the utility makes improvements and as other changes occur, if and as the utility performs and develops more like a rate scenario modeled, the utility could adjust rates as recommended to match new conditions.

As to services and other costs required to complete services, and the timing of those services, I estimate the following:

1. The same day, or within a few days after being given notice to proceed, I will contact Argonne's contact person. As directed by Argonne, either they, both of us together, or I will contact the Nation's contact person or people to discuss data needs, how to gather that data and similar start-up issues.
    a. Such contacts should be complete within days of project start and take two or three hours for me to complete.
2. Utility staff will gather what data it can. I will gather some general data and information.
    a. This step is dependent upon the speed at which utility staff can gather data. We might assume it will take utility staff two months of elapsed time to gather data. That is not two-months' worth of a staff person's work time. Rather, it is likely that two months will elapse as they gather data and continue to do their regular work, as well. My part of this work will likely take 10 to 20 hours to complete.
3. Using data we gather and develop, and assumptions I will make, I will prepare a rate analysis model that will depict the utility's operating costs, growth and changes in operating costs, customer usage and numbers, future system improvement costs, how those might be paid for and similar criteria. These will be used to calculate a set of rates that are projected to be adequate to pay all system costs, build appropriate reserves and do so using a rate structure that is as fair as conditions will allow.
    a. It is likely one month will elapse as I do this work. The work will likely take me 15 to 30 hours to complete.
    b. If and as appropriate, I will prepare one or two additional "scenarios" that depict a different set of assumptions or rate structures. Each such scenario will likely take me an additional five hours to complete.
4. Based upon the results of the modeling just described, I will write a narrative report that summarizes the data, my assumptions, and the results and my recommendations.
    a. That work should add two weeks to the project timeline and take me 20 hours to complete.

5. Normally, one on-site meeting is all that is needed. But, I assume the Nation will want me to make two trips to appear in person, one to discuss my preliminary findings and results, likely with the council only; and another to discuss final findings and results, likely with the council in a public meeting. Generally, scheduling of such meetings is arranged before I have completed a prior step or two, so the wait time to arrive at each meeting does not normally add any or much elapsed time to the project.
    a. My work time prepping for and presenting during these meetings is only a few hours, but it will consume two work days of travel time for each meeting. Note: I bill travel time at one-third the rate of work time.
    b. Travel costs to attend on-site meetings are normally the only costs I incur and those will be billed separately.
6. If there are not long delays in data gathering, or delays in the completion of other things that the Nation wants modeled, the entire project should be completed in nine months and take me 60 hours of work time, plus approximately 30 hours of travel time, to complete.

What is a "Scenario?"

When I deliver (e-mail) to Argonne or the Nation a distinctly different report, which may include multiple rate analysis models, that is one "scenario." If I send a report, Argonne or the Nation requests edits and I return the edited report, that is not a new scenario. It is the same scenario, but it is a work in progress. A report only becomes a new scenario when that report has something distinctly different about it – modeling of a different rate structure, a different set of costs, a different capital improvements plan, different timing for installing customer meters and the like, and I actually send that new report. Differences in such factors will cause rates to be higher or lower and usually in a different rate structure.

Basically, if one report replaces an existing report and has the same name, it is not a new scenario. It is just a new draft of an earlier draft.

Work Coordination and Contacts

Generally, I will only communicate with designated contacts about the analysis. There are degrees of exceptions:

1. I keep WARWS informed of my activities through the RATES Program. Therefore, I copy them on proposals, invoices, rate analysis reports and similar communications. I have an understanding with them that they will not divulge to others, information I share with them. Other than, perhaps, using the project as a teaching example, they have little call for discussing this situation with others anyway.
2. It is rarely, but sometimes, beneficial for me to contact funding or permitting agencies, and similar entities, about funding options and such. But I would discuss that with my contacts first. I prefer that my clients make such contacts when they are able.
3. On occasion, a ratepayer, business or someone else who would be affected by new rates will call or e-mail me direct. In those situations, I speak courteously with people and give them general information about how I perform analysis and the like. But, I do not divulge important specific information about the client's analyses. I leave that up to the client. I apply this practice to council members, staff and other people who are not designated contacts, but who are concerned about the rate analysis or they want to "guide" the analysis even though they are not one of my contacts. Sometimes, people "go rogue." I guard against that.

Early on, Argonne will designate a person to be my contact. Argonne may prefer that I work directly with a contact for the Nation for data gathering and the like. When we progress to the reporting out stage the Nation may want to also designate a policy-related staff person or governing member as I prepare rate, fee and proposed policy action recommendations. If Argonne allows me to make direct contact with the Nation, I will keep Argonne informed about those contacts.

I sum up my contacts policy like this. Argonne will be my employer and the Nation will be my client. I work for both, through my contacts, and no one else. When I give my work product to my contacts, it becomes the property of Argonne and the Nation, and no one else. I do not make my work product public, my employers and clients make that call.

Use of Electronic Technology

I do almost all analysis work electronically and remotely, receiving and sharing data and information by e-mail attachment. I prefer to receive numerical data in a spreadsheet format and textual material in a word processor format, but we can work with other formats, too. When I return material that the Nation needs to manipulate further, such as a revised ordinance or rule, I will return it electronically in a format convenient for that purpose. My analysis reports, the analyses and my recommendations will be sent to my contacts electronically as PDF documents.

Investment

Because the Nation is a member of WARWS, it qualifies for the 25 percent Wyoming RATES Program discount. Therefore, following are the complete investments for my services, materials and travel costs, based upon the service descriptions above:

- **Hourly rate for work** – full fee of $152.49 per hour, less the Wyoming RATES Program discount of $38.12 per hour, yields a **net fee of $114.37 per hour** (Note: invoices will be issued no more frequently than monthly. They will include a copy of the timesheet I run for work and travel on your project.)
- **Hourly rate for travel time** – full fee of $50.83 per hour, less the Wyoming RATES Program discount of $12.71 per hour, yields a **net fee of $38.12 per hour**
- **Out of pocket expenses –** (airfare, car rental, lodging, meals and similar travel expenses), at actual cost, based upon receipts.

Assuming 60 hours of work time, 32 hours of travel time and modest travel costs, the total investment will likely be $11,470, or less.

Proposal Acceptance

This proposal is effective through December 31, 2021, if I receive notice to proceed by February 1, 2019. Once I am given notice to proceed, I will immediately start work on the items in the scope of services.

Action item: If you accept this proposal, call me or e-mail me to tell me.

Promptly given the data I need, there is no good reason why I cannot complete the analysis part of the project by the summer of 2019, and the entire project by the fall of 2019.

However, Argonne is welcome to use my services through the end date stated above. And, if the Nation desires to have me work directly for it on issues outside of those covered by this project, or beyond the time during which I am working by subcontract to Argonne, I will be happy to do so directly for the Nation at these rates through December 31, 2021. If either desires it, I will be glad to continue such services to either beyond that date, but I will first notify them of the billing rate I will be using at that time and get approval of that new rate before proceeding.

Payment

I will invoice no more frequently than once monthly. I will include a time sheet with each invoice. Argonne shall promptly pay the full amounts of invoices.

In Closing

I am looking forward to the opportunity to conduct this rate analysis, and help the Nation get the utility rates and finances on a sound footing.

Best regards,
GettingGreatRates.com

Carl E. Brown
President

Water Rate Analysis Report

Northern Arapaho Water and Sewer Department

Ethete, Wyoming

Prepared October 28, 2019

Carl Brown, President
GettingGreatRates.com, LLC

Table of Contents

Index of Model Tables and Charts

Northern Arapaho Water and Sewer Department; Water Rates Models

On Water and Rates

Water is a molecule made up of two hydrogen atoms and one oxygen atom – H_2O. Water can be broken down into its atomic parts and it can be reformed into different molecules but the material or energy in a water molecule cannot be destroyed. The chemistry is important because water is life. We cannot live without it.

Thus, it seems a bit odd that we should have to pay a price – water rates – to buy water. We must have it or we die.

But the price you pay to buy water does not purchase the water – the molecules that keep you alive. The water is free. The price you pay is needed to have someone else find the water, pump or draw it from its source, treat it, store it and pump it to your home or business in an underground pipeline system so you can turn on your tap and get healthy water, "24/7/365."

Besides water, you have other needs to sustain your life and enable you to make a living. If you cannot acquire or make all these things yourself, and none of us can, you hire those things done:

- Bankers lend money to you (they don't give it to you) so you can buy cars, homes and more;
- Grocery and other stores sell you food and other necessities (they don't give it to you). They even sell you bottled water;
- Cell phone companies keep you connected, for a fee; and on and on.

Water service is difficult, technical and expensive to provide. But no one owes that service to you. You can acquire water yourself, if you have the expertise and access to water. Or, you can buy water service, which includes the water for free, from a local utility.

People, Entities, Names in This Report and Their Relationships

The Northern Arapaho Tribe, located at Fort Washakie, Wyoming, will later be called "the Tribe,"

Northern Arapaho Business Council, will later be called "the Business Council,"

Northern Arapaho Water and Sewer Department will later be called "NAWSD."

The Northern Arapaho Tribal Engineering Department Director is Ms. Jola Wallowing. Ms. Wallowingbull served as my primary NAWSD information and data source for this project.

Argonne National Laboratories, the coordinator of this project, will later be called "Argonne."

James Gore and Associates; Wester Wetstein and Associations; NECH; TST; HDR; are engineering and scientific consulting firms that have produces several engineering reports for NAWSD and funding agencies. Their reports will be referred to collectively as the "engineering reports."

David Myer, the consulting engineer for NAWSD, contributed updated capital improvement costs and related information and data.

My firm, "GettingGreatRates.com," will later be called "GGR" or just "I."

NAWSD has a water system that serves the Tribe. NAWSD needs to access a new water source for that system. Argonne was tasked with facilitating that. Engineering investigations and planning for such improvements have since been completed and detailed in the engineering reports. As part of the project, Argonne seeks to develop appropriate water user charge rates for NAWSD. Argonne engaged GGR to develop those rates.

Water service provided by a central organization is not perfect. But you have a say in how this system is operated, so don't be a stranger to your local utility. Their jobs exist to serve you. Tell them how you want to be served.

The Meaning of This Report, in a Nutshell

The Northern Arapaho Tribe, located in and around Ethete, Wyoming, has a water system under the management of the Northern Arapaho Water and Sewer Department. This system is well described by, and has improvement needs as detailed in engineering reports produced for NAWSD.

The engineering reports, of course, covered engineering and related issues. That includes discussion of the need for certain system improvements, the nature of the customer base, use projections, as well as finances and rates. More recently, David Myer, the NAWSD consulting engineer has designed and overseen system improvements and is continuing that process. Mr. Myer gave me updated data and information on improvement issues.

I appreciate the work of these engineering firms because I would otherwise need to cover many of the issues they covered. Because they have already done so, I will merely draw from and build upon those engineering reports to address what I was assigned to do – help NAWSD arrive at a set of rates that, perhaps with or perhaps without subsidies, will fund the operation, maintenance, debt service and equipment replacement needs of the utility.

NAWSD needs new rates for many reasons, including these:

- The utility is quite under-funded,
- The utility has historically under-billed and under-collected on those bills, and
- The utility is facing the need for large, costly investments.

Because of these big challenges and a lack of data, this report is long and complex. I had to explain assumptions and why I made them. Do not get lost in the length and complexity of the report.

The bottom line is this. I calculated different sets of rates that would fully fund costs through rates, or that subsidies from the Business Council would continue, or that NAWSD would not fully staff maintenance of the systems and a few other variations.

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Background

GGR was hired months ago to perform rate analysis of the NAWSD water utility's rate setting needs and help NAWSD inform the Business Council about the rates needed to fund the utility.

Production of the rate analyses and this narrative report have been a work in progress. From project inception to about two months ago, data gathering, and preparation of this report have been difficult. Much of the data needed for a complete analysis does not exist. Other data has been produced as late as October 25, 2019. Following is a synopsis of how the report came together.

I submitted numerous information and data requests to my initial contacts; Mary Picel with Argonne, and Jola Wallowingbull with NAWSD. They sent me data and information. We went through several iterations of this step, gathering data and modeling rates.

There was another information and data exchange on August 1, when Ms. Wallowingbull sent me new information and guidance for modeling and reporting. I subsequently modeled NAWSD rate needs using that data and submitted those items for review and feedback. My contacts reviewed that submittal. With that feedback, I prepared and submitted a draft full report.

Another data and information exchange occurred on October 8, 2019, when Ms. Picel sent me new information and guidance, most of which originated from Ms. Wallowingbull. I prepared another set of models and a narrative report accordingly and submitted those items for review and feedback.

On October 24, I and others traveled to Ethete to meet with staff of the water utility, the Engineering Department, Argonne and David Myer for his firm. We had a broad discussion of the utility's situation, status of the rates initiated by the utility three billing cycles ago, collection rates for those bills and more. Quite importantly, Mr. Myer discussed capital improvement needs, construction progress and funding of upcoming projects, as well as how these improvements have been and will be funded. Operations staff told me that current staffing of the utility is not adequate to keep the utility sustainable. Both committed to get details of that information to me within a day or two.

After such data gathering, I have prepared new models and this, my final report.

I related all this not to seek solace for having produced numerous iterations of models and reports. I did it to highlight two facts:

1. This report is the product of long and thorough efforts to get the best data and information available at this time, and
2. The difficulty in doing this highlights the fact that the utility, its ongoing system improvements, its user charges, collection rate and much more truly are and will be a work in progress for a long time. Thus, this report will not finally and completely settle the rate setting issue for the utility. It will get you started on productive actions.

Introduction

Adequate rates are job one in rate setting. The utilities' revenues are far from adequate to cover current needs. They certainly will not cover the full cost of capital improvement and system staffing needs that are approaching.

Job two is setting rates in a fair structure, preferably in a cost-to-serve structure. The recommended rates will bring you closer to that goal structure but there will be much work to do in the future before you can say you truly have cost-to-serve rates. And you may not get all the way to that goal. Many systems do not. But you should move as close as you practically can.

NAWSD should assess to its customers rates that will properly fund the utility and do it as fairly as possible. Those rates will cover a small part of the improvement costs, but you are only being asked to cover a remarkably small part of those costs. The bigger issue for rates is covering operation, maintenance, repair and replacement costs. Those costs are partly related to equipment. But mostly they involve management and operation of the system; the work that must be done by people with water system and other expertise.

In this regard, the NAWSD system is like every other utility system.

The billing clerk for the utility noted in the October 24, meeting that collection of the first two months of bills sent out by the utility has been 25 percent. Seventy-five percent of residential bills have gone unpaid. Commercial customers have been paying, but residential customers, who have been billed a flat $20 fee, are far behind. That is a small bill for water as compared to almost any other U.S. water utility and a 25 percent payment rates is shockingly low.

That said, by establishing a $20 flat residential bill and by sending out those bills, you have started down the right path. In this report I will lay out follow up steps you should take.

As to the report itself, it is detailed. I will give you the "Cliff's Notes" version here.

The notion the rate calculations in this report are based on is called, "cost-of-service" rates. Methods for developing cost-of-service rates are described best in the American Water Works Association's M1 Manual, "Principles of Water Rates, Fees and Charges." Cost-of-service is the prime industry standard for utility rate analysis. Described simply, if a customer causes the utility to incur a cost, that customer should reimburse the utility for that cost.

The NAWSD rates are at a much more basic level than most. The rates I calculated are not cost-of-service rates at the customer level, but they will get you started toward that goal. Consequently, your rates will be more of a moving target than most. You will need to be flexible and make rate adjustments sooner and more often than other utilities to move closer to cost-to-serve rates. But your rates will eventually "settle down," as most other utilities' rates have.

Finally, different customers have a different idea of what rate structure fairness is. Most will base their view of fairness on what the proposed rates will do to the water bills they are paying, or not paying, now. If their bill will go down under the new rates, they will think that is a fair adjustment. If their bill will go up, they will think that is not fair.

Everyone needs to set a different benchmark for what is a fair rate adjustment. It is not the bill you are paying now. It is what it costs to serve you. If you are now paying more than the cost incurred to serve you, that bill is unfair to you. If you are now paying less than the cost incurred to serve you, that bill is unfair to others because they are subsidizing you.

This report is in two parts. The first is this narrative report that tells readers what should be done to the utility's rates and why. The report also covers other issues besides the rates themselves.

The second part is a printout of each of the spreadsheets that model rates under different sets of assumptions. The models, nearly identical to each other, are a set of integrated calculations that mathematically depict the utility's situation and how I arrived at the rates for each set of conditions.

As you read this report, please keep this in mind. The report does not *direct* NAWSD or the Business Council to do anything. Actions you take or do not take are strictly up to you. The report is meant to inform and educate so you can then make well-informed decisions about actions to take. And the report and models are not legal recommendations. For legal issues consult your attorney.

For most systems, I recommend meter size-based system development fees and minimum charges. Why different rates for different meter sizes? Quite simply, "big" customers cost the utility more, in terms of capacity to serve. Thus, "big" customers should be assessed higher system development fees and minimum charges.

You could choose to assess the same minimum charge to all customers, regardless of meter size. If you did that, it would probably only boost the minimum charge of the small meter customers by two to perhaps three dollars per month to make up for the capacity fees that would not be collected from the few larger meter customers you have. As you can see, meter size-based minimum charges are not much of a revenue issue – they do not generate that much extra revenue when there are few large meters. Instead, they are a rate structure fairness issue. All that said, if adopting and diligently collecting on a set of rates will be easier if you have level minimum charges, you should adopt level minimum charges. When you get that down, you can work on meter size-based minimum charges in the future.

To the point of simple rates, Ms. Wallowingbull's most recent guidance to me was that the Business Council is looking for residential rates that include one flat monthly fees for all residential customers. That is quite different from cost-of-service rates, but that is the structure you have now, so it makes sense to adopt a similar set of rates, at least initially. I calculated such rates. Actually, I calculated meter size-based minimum charges and unit charges for all customers, including residential customers. I then converted the residential rates to a single flat fee for residential customers based upon the average volume used by all residential customers. Thus, the flat fee for all residential customers is the bill amount that the average volume use residential customer would pay under a minimum charge plus unit charges fee structure.

The resulting rates to adopt are presented later in this report. Rates will need to be revisited soon and reset periodically. Your rates, like all other utilities' rates, will be a work in progress.

High Priority Actions to Take

Whether you adopt rates to be recommended later or not, I recommend you take these steps, in this priority order of importance:

1. Start measures to raise the collection rate markedly. Most water utilities have a collection rate of 95 to 99 percent. You may not get there, but a collection rate of 25 percent is not at all sustainable, practical or fair to those who do pay.
2. For those customers that would find the $20 bill to be a financial hardship, as verified by affordability criteria, you should at least consider initiating a hardship assistance program.
3. As receipts improve, compare those receipts with costs. If more revenue is needed, raise rates at a reasonable pace to close that gap.
4. Finally, transition the residential flat rates to a structure that includes a minimum charge and unit charges for use. Such a structure will likely lower bills for some low-income, low-volume customers and turn those customers from hardship assistance program customers, into full-paying customers, thanks to appropriately lower bills. Such rate structures were modeled, and those rates appear in subsections to follow.

Note that the above recommendations all relate to "slow-pays" and "no-pays," as we in the industry refer to them. To make dealing with them easier and more effective, you may find information and advice in Chapter 4 of the "Rate Setting Issues Guide," which I have e-mailed to Ms. Wallowingbull, to be useful.

Lower Priority Action Recommendations for Policy and General Issues

As allowed by Tribe statutes or other legal instruments, use the following as a checklist of "to-do" tasks:

1. As soon as possible, begin finding and fixing "daisy-chained" connections, discussed later.
2. Periodically determine how long, on average, it takes to perform the various services you provide in the field, such as after-hours service, meter disconnects and reconnects, special meter readings, delivery and pick up of bins and dumpsters, etc. Be sure to include all the time you actually pay staff for performing these services. Then determine how much it costs the utility per hour, on average, to have staff perform these services. This includes benefits, taxes, use of utility vehicles, tools and minor equipment, etc. It should also include a fair amount to cover the time that office staff devotes to working on these services to track them, bill for them, etc. This should be the hourly rate or a set fee you will charge for these services. In addition, set a minimum that you will charge for showing up, whether the service takes an hour to perform or 10 minutes. In essence, set your fees in the same way plumbers and similar technicians do – a set fee for showing up, which buys the customer a set amount of time, and an hourly rate if the job takes longer than the show up charge will cover. While accounting for time and other

investments in the various functions is important, do not make the process burdensome. For many functions you likely can just estimate your time occasionally and charge fees based upon those estimates.

3. Retain required funds in interest bearing debt service and debt reserve accounts when required by your lender(s).
4. Have me conduct a full rate analysis again when the actual financial performance and my projection of future performance significantly diverge, or when dependable usage and financial data is then available.
5. Track volume usage, incomes and expenses on a regular basis so the data and information you generate will support future rate analyses.
6. As a reminder, check with your attorney for language and legality of all charges and issues discussed.

The remaining sections of this report cover each of the models I created. Each section discusses important issues for that model. At the end of each section is a set of recommendations, in addition to those above, and a table that shows the recommended rates and fees.

Rate Setting Resources Beyond This Report

Over the years, I have found that several topics are common to lots of utilities. I used to specifically write such things into each rate analysis report, stretching the length of those reports. Now, I cover such things in separate guides, all available for FREE download at https://gettinggreatrates.com/freebies/freebies.shtml. Following is a listing of several guides and resources:

1. How to Get Great Rates© (e-book)
2. Rate Setting Issues Guide©
3. Replacement Scheduler©
4. CIP Scheduler©

The first two give guidance on rate setting and related issues. The last two are spreadsheet applications that enable users to build their own equipment repair and replacement and capital improvement schedules, calculating their costs and calculating revenue needed to pay those costs. In fact, these spreadsheets were extracted from my modeling template and made a bit more user-friendly for do-it-yourselfers. You will see these same sheets in the models in this report.

Later in this report, when I leave an explanation of something to one of the above resources, I will tell you in which resource you can find the detailed discussion of that issue.

There are other guides and resources on that site. All are FREE, so I invite you to check them out.

Rate Analysis Model Names

First, all the models assume nearly 100 percent grant funding of capital improvements. I have never heard of such a high rate of grant funding. However, that is how nearly all of your capital improvements, most of which have been completed or have been bid and are in the process of being constructed, have been funded. Those that have not yet been bid have already secured funding commitments of nearly 100 percent grants.

With the above already stated, in the report, I call each rate calculation model by the following names:

1. The first model is called, "NAWSD Model 2019-7 – Full Staffing, Stop Subsidies" model. Later, I simply call this the "Full Staffing, Stop Subsidies Model." This model assumes that starting in 2020, NAWSD will add enough staff to be considered fully staffed and NAWSD will wean itself from Business Council subsidies by 2024. The following models are variations on this one.
2. The second model is called, "NAWSD Model 2019-8 – Low Staffing, Stop Subsidies" model. Later, I simply call this the "Low Staffing, Stop Subsidies Model." This model assumes staffing will remain low but NAWSD will wean itself from Business Council subsidies.
3. The third model is called, "NAWSD Model 2019-9 – Full Staffing, Keep Subsidies" model. Later, I simply call this the "Full Staffing, Keep Subsidies Model." This model assumes that starting in 2020, NAWSD will add enough staff to be considered fully staffed but NAWSD will continue to receive Business Council subsidies at a level that makes water bills affordable for the average residential household. Based upon the best data available for this analysis, an affordable rate will be a monthly bill at 1.0 percent of the median household income. This subsidy will go on well into the future, perhaps perpetually.
4. The fourth and last model is called, "NAWSD Model 2019-10 – Low Staffing, Keep Subsidies" model. Later, I simply call this the "Low Staffing, Keep Subsidies Model." This model assumes staffing will remain low and the Business Council would continue to subsidize NAWSD. These rates are close to the current rates.

Comparison of Rates and Business Council Subsidies

Each of the sets of rates named above covers a different combination of incomes and staffing expenses, so the rates are different in each of the models.

The following Table A shows the residential bill from each model and how those bills compare to the most expensive situation for the utility. That situation is the one where the utility would fully staff its operations and the utility would give up Business Council subsidies by 2024.

Table A: Bill Comparisons Among the Models

Table A - Comparison of Residential Bills From the Four Models

Monthly Bill for Full Staffing, Stop Subsidies Model	Model Being Compared	Monthly Bill From This Model	This Bill is Cheaper by:	This Bill is Cheaper by:
$58.55	Low Staffing, Stop Subsidies	$44.55	$14.01	24%
$58.55	Full Staffing, Keep Subsidies	$31.36	$27.20	46%
$58.55	Low Staffing, Keep Subsidies	$17.34	$41.21	70%

The Business Council currently subsidizes the utility, effectively keeping user charge rates lower than they otherwise would need to be. The discussion group asked what the effect on rates would be if the subsidies continued, and if the utility was fully staffed or if staffing remained at the current level. Table B that follows depicts all four possible alternatives.

Note: According to operations staff, the utility is understaffed by approximately four full-time equivalent staff people, so keeping staffing low may not be sustainable. Still, these comparisons should be useful to the Business Council to see how the four alternatives compare.

Table B: Cost to Business Council for Each Set of Rates

Table B - Cost to Business Council for Each Set of Rates

In order to keep the utility operational and to keep user charge rates at the levels in each model, the Business Council must subsidize the utility by these amounts over the next 10 years.

Full Staffing, Stop Subsidies	Low Staffing, Stop Subsidies	Full Staffing, Keep Subsidies	Low Staffing, Keep Subsidies
$1,250,000	$1,250,000	$6,288,946	$6,288,946

Data Issues and Related Assumptions

Much of the data and information used in the rate analysis models comes from engineering reports created about ten years ago. There is little more recent data.

1. Financial data

The Tribe maintains financial budgets and books and produces financial statements. NAWSD costs are included in those statements but they are not all identified separately. However, operations staff submit a proposed budget each year, so that information was used for system operating costs.

NAWSD is not set up and managed as an enterprise fund. Such an entity provides goods or services to customers for a fee. Enterprise funds are managed and funded to be self-supporting, they maintain their own set of books and financial statements and they maintain their own fund balances. It would be appropriate for NAWSD to operate as an enterprise fund. NAWSD would still be owned by and answerable to the Tribe, but it would be a business-like enterprise owned by the Tribe. However, because your rates are so far from making the utility a self-supporting enterprise, it may be premature to set the utility up as an enterprise fund at this time. But you still can begin to separate the budgets, reports, funds and other things and processes that are directly related to the utility.

Because NAWSD does not have its own set of financial statements and not all its costs and incomes can be identified within the Tribe's statements, most financial data had to be estimated.

Rate Analysis, in a Nutshell

At its simplest, rate analysis helps a utility arrive at rates and fees that are adequate – they will pay all the utility's costs. The next level of complexity is to arrive at rates that, on an average cost basis, will enable the utility to recover fixed and variable costs "fairly." Most small water and sewer utilities need analysis only to this level of complexity – doing more results in rates that are overly complex.

Another level of complexity includes calculation of meter size-based minimum surcharges and system development (connection) fees. Another includes calculation of rates on a "marginal" cost basis, for special groups of customers. Yet another level is marginal cost basis calculation of rates for individual customers, such as a wholesale customer. These facets of analysis result in accurate but complex rate structures; appropriate for a larger utility with diverse customers.

Analysis can and should provide a sound basis for advising the utility to "go or don't go" concerning various actions it might take. Some of these actions are purely financial. Some, like the decision to enter into, or not enter into, a wholesale supply agreement, for example, include "hassle factor" and other non-financial issues.

As a starting place for costs, I used the total operating costs estimated by the engineering firms in their engineering reports of a decade ago. I increased those costs by two percent per year for ten years, to account for inflation, to arrive at the total estimated operating costs in 2018, the test year for these rate analyses. For 2019, I used the operations staff budget.

2. Customer data

NAWSD has and uses a billing program for calculating bills, billing customers and the like. However, not all customers were billed in the past and not all billed customers paid. Records of such were not maintained. Fees received were, and I assume still are deposited directly to the Tribe's accounts, not NAWSD accounts. Payment receipts for the last two completed billing cycles show that only 25 percent of residential customers have fully paid their water bills.

Another troublesome issue is lack of dependable volume usage data. Elsewhere, the common rate structure is a minimum charge per bill for each customer, plus unit charges calculated on the volume that each customer used during the billing period. In your case, some customers, generally the larger commercial customers, are billed based upon usage data. But without complete usage data, I cannot calculate unit charge revenues to be collected from other customers that are not billed based on usage. Thus, I had to estimate average usage for such customers.

The engineering reports included estimates of average per capita daily usage and estimates of the populations served by each system, but I and the current consulting engineer consider those volumes to be too high. To be more conservative, I assumed residential use at 7,000 gallons per residential customer per month. I suspect that usage rate is still somewhat high.

In addition, Bill Frazier with the Department of Energy related to me through Ms. Picel that commercial customer use was recently metered at 4,200,000 gallons total for a one-year period. Thus, the average use per commercial customer per month worked out to 8,333 gallons. I used this usage rate for commercial customers.

After making these adjustments to usage, total systems-wide usage was 76,272,000 gallons for the test year. As NAWSD meters usage in the future, staff should compare the usage rates being metered with this rate of use to assess whether the rates that follow will bring in the intended revenues or not.

3. Rate Structure Desired by the Business Council

Ms. Wallowingbull informed me that the Business Council recently adopted a new set of rates, those rates include a set of flat fees ($20.00 per month) for residential customers and the Council desires to stay with a flat rate structure for residential customers. I had already calculated residential rates as I did for commercial customers; a minimum charge to recover fixed costs, plus a surcharge to recover part of the capacity costs, plus unit charges to recover variable costs. Therefore, I calculated the flat fee equivalent of the average residential customers' bills to arrive at a flat rate.

In addition, in the past the rate structures included a fee for non-enrolled Tribe members and a lower fee for enrolled Tribe members. I included those classes in the models. Ms. Wallowingbull informed me recently that the Business Council does not desire such two-tiered rates, so in the models, I set the rates to be the same for all residential customers.

A final word on these flat fees: They are in (almost) a cost-to-serve structure at the rate class level. But because the same bill will be assessed to the entire class of customers, they are not in a cost-to-serve structure at the individual customer level. Such a structure is covered in the next subsection. Commercial rates were calculated as next described. Even the basis, the starting place, for calculating the residential flat fees comes from the following approach.

Cost-based Rate Calculations

Note: Cost-based rates start with actual costs. In your case, little actual cost data was available for these analyses. Thus, the following approach does not apply perfectly to how I calculated your rates. Plus, at this stage you simply do not need rates as sophisticated as described in the following. But this discussion should help you figure out what the end goal may be and show you what data you need to start recording to get to that end goal. You will need such data for your first full and complete cost-of-service rate analysis. The sooner you can do that, the sooner you can take the next rate setting steps toward the long-term rates you will need. For now, simpler rates are the goal. Thus, if you do not need to know how future, cost-of-service rates should be calculated, you may skip this subsection entirely.

To give you a synopsis of rate analysis, as I do it, and to make it easier for you to read and understand my findings and recommendations, a tutorial on my methodology is in order. This description uses water as the example media, but the notions generally apply to other utilities, too.

When I analyze rates for a government-owned water-based utility, and other utilities that are empowered to assess cost-of-service rates, I use the cost-needs approach. This approach is exhaustively described in the American Water Works Association's "M1 Manual, Principles of Water Rates, Fees and Charges." This manual, in use since the 1960s and periodically updated, is considered by many to be the "Bible" of water rate setting best practices. The cost-needs approach is a static (one year) rate calculation. I enhance that approach by projecting costs and revenues into the future, so rates and revenues can keep track with inflation and other changing factors.

The cost-needs approach results in rates that are called, "cost-to-serve" or "cost-of-service" rates. Simply stated, the costs for a targeted time period, usually in the near future, are classified as "fixed," "variable," "capacity to serve" or some combination of the three. Fixed costs are converted to a minimum charge. Variable costs are converted to a unit charge. Capacity costs are converted to some combination of system development fees and surcharges to the minimum charge.

The first step of this classification process is carried out in Table 8 of each model. The "Average Fixed Cost/User/Month" from Table 8 of each model is used for calculating the base minimum charge. Also, from that table, the "Average Variable Cost to Produce/1,000 gallons" is the basis for calculating unit charges.

The second step in rate structuring is to arrive at capacity costs. In each model these were calculated in Table 11 and distributed to system development (tap-on) fees and surcharges to the minimum charge in Tables 13 and 15. The capacity "share" of costs of each meter size is based upon the calculated shares in Table 12.

The third step is to project costs ten years into the future. Generally, this is done by applying an expected inflationary factor to each cost. Some expenses, like postage, permit fees, taxes, treatment chemicals and electricity, rise with inflation plus growth in the customer base or use. Those were increased in future years by both factors.

The fourth step is to set reserve goals and project those through the tenth year. Those goals will only be met if rates are set high enough, costs are reduced, the Utilities subsidizes the utility or other measures are taken.

The fifth step is to calculate the full suite of rates needed to fully fund the utility. This is a dynamic set of calculations that is too complex to completely explain here. I will leave out some details. The "Cliff's Notes" version is this:

- The calculated bases for fixed costs and variable costs (Table 8) establish a ratio of the revenues that each rate component would generate.
- To increase overall revenues to a target, each revenue stream is increased by the same percentage. Thus, the revenue streams remain in the same ratio to each other. That maintains the cost-to-serve nature of the resulting rates.
- Once the overall revenue increase need is established, the base minimum charge is "back calculated" from the minimum charge revenue stream. The unit charge is "back calculated" from the unit charge revenue stream. The resulting rates are the starting rates, what you will (hopefully) adopt initially. In later years, you will increase these starter rates and fees by an inflationary factor. With each round of across-the-board increases the rate structure will diverge from a true cost-to-serve structure. But, until you reach a total increase of around 20 percent, the rate structure will be close enough to cost-to-serve that a new comprehensive rate analysis will not yet be needed.
- Of course, system development fees, minimum charge surcharges, investment earnings, penalties and other income sources generate smaller revenues, which are added to rate revenues. And, I assumed future inflationary rate increases, so those revenues are added over the years, as well. Without explaining the details, you should have a sense that, while the math is complex, the rates are calculated to be proportionate to the costs each customer causes and the revenues will be adequate to cover all costs for the next ten years. That is, if our projection of costs and other things turn out to be accurate.

Cost-to-serve rates are considered by many, including me, to be the most mathematically fair and defensible rate structure. However, there are often good reasons to adopt rates that are at least somewhat different from true cost-to-serve rates. Thus, a cost-based rate analysis often is just the starting point for calculating the rates that a utility may eventually decide to adopt.

I usually recommend meter size-based minimum charges composed of two parts:

- One is the basic cost to make any level of service available to any customer. These are the so-called, "fixed costs." Billing, general administration and similar costs that are the same for all customers, regardless of "size," make up the base minimum charge. To make it easier to understand this concept, and related concepts, I use catch phrases. For this type of cost, the phrase is: ***These costs are related to the fact***

that you have customers. For every customer you have, you incur one increment, or "share," of this type of cost.

- The other part of the minimum charge is a surcharge intended to recover all or part of peak flow or unusual capacity costs. These are almost always based upon water meter size because the larger a meter is, the greater is its capacity to sustainably pass peak flows (as determined by American Water Works Association studies). This peak flow capacity relates well to the cost of building infrastructure "big enough" to handle peak flows. ***Capacity costs are related to the fact that a particular customer has a certain capacity to demand flow or service, regardless of how much flow or service they actually use.*** The surcharges are added to the base minimum charge to arrive at the surcharged minimum charge for each meter size.

With this structure, the smallest meter size customers end up paying the lowest minimum charge. As meter size goes up, a higher capacity surcharge is added to the base minimum charge resulting in ever higher total minimum charges for larger meter size customers. Remember: It's not just how much water such customers use that determines how much they cost the utility. It's how big and robust they cause the utility to be built, because it must be built robust enough to handle their maximum demand should they someday draw it.

Unit charges are related to the volume of service received. While unit charges can be structured in various ways, the revenues they generate should be adequate to pay those costs that are related to the flow that customers actually use.

There are three main unit charge structures that I recommend in different situations:

- Some systems need "conservation rates," or, their administrations simply like the notion of encouraging customers to use less of the utility's services. In this rate structure, the unit charge goes up as volume used goes up. Most of us respond to, or at least we think twice about it, when we are assessed a higher price to buy more of something. Conservation rates are most appropriate in areas with limited water supplies or in utilities that are bumping up against their infrastructure's capacity to produce water.
- Most systems use, and should use, level unit charges – a unit charge that is the same regardless of how much volume a customer uses. With level unit charges, everyone is assessed unit charges at the average unit cost. Such rates are the easiest to calculate, they are the easiest for a clerk to explain to a complaining customer on the phone and the revenues such rates will produce next year are the easiest to accurately predict. I like to tell most of my clients that if they are going to err either on the side of complex rates that precisely assess costs to each customer or simpler rates that round off some of the accuracy corners but are easier to administer, choose simple rates. Most water service is billed using level unit charges.

- The last major unit charge structure is called, "declining" rates. These are the reverse of conservation rates. I often call them, "use encouragement" rates. It is popular these days for many to belittle those who do not conserve resources at every opportunity. Declining rates are often scorned for that reason. However, if a system has an ample water supply and ample infrastructure to produce and distribute it, doing so will not cause unintended bad (mostly environmental) consequences; and if the governing body wants to encourage high use (which often entails such users hiring more or better paid workers), declining rates make good sense. Declining rates are most appropriate in areas that have a high concentration of high water-using industries or in an area where folks want to attract such users.

To complicate the aforesaid just a bit, rate setting is, indeed, about recovering costs. Job one of utility rates is to pay the utility's costs. But usually proper rate setting is also about building adequate reserves; funding a capital improvements program (CIP); catching up on needed equipment repair and replacement (R&R); and covering similar needs. Thus, these soon-to-be-experienced costs or likely-to-be-experienced costs need to be factored into rates and fees, as well. Because time marches on and costs usually inflate over time, rate setting should account for future incremental increases to cover inflation. And, you cannot just assume that because the utility needs more revenue that your ratepayers will be glad to pay higher rates. Rate affordability, and the public's perception of affordability, must be addressed, too.

Even the simplest rates situation requires some complex and integrated calculations to account for these factors. For that reason, I build a spreadsheet for each analysis that depicts, in virtual reality, the utility's real-life financial and rates situation.

These models are dynamic. When the initial rate increase is set higher, future inflationary increases can be lower. When minimum charges are set lower, unit or other charges need to be set higher to make up the revenue shortfall. When system development fees are assessed, the utility's other charges can be lower. When future expenses need to be higher, or lower, or of a different nature, the model adjusts rates and fees accordingly. Such modeling enables me to do dynamic "what-if" scenario calculations. That enables me to arrive at the "best fit" rates for the utility.

Coincidentally, such a dynamic model makes it easy to calculate rate and other changes over the next two or three years, too. If, in the next two or three years, you find that something is going to be different from what we initially assumed, and you think it will affect rates and revenues, just give me a call. I can adjust the model and re-run the rates. Most adjustments like that take me a day or less to do, so the fee for that additional service usually runs less than $500. And, oftentimes, I find I can just talk clients through most situations for no fee. It is not just likely you will need to make such rate adjustments in the future. It is planned into the rates I am recommending now. Therefore, keep this in mind over the next few years and just call when you don't know how to approach a situation.

Two final thoughts on this topic:

- Almost always, rate adjustments include revenue increases. Thus, time is money, often big money, to the utility. A rate increase delayed is a rate increase that must be even higher to reach the same reserve target. Get to know this report well but do not spend months mulling it over. Time will not make your rate setting task easier. Proceed deliberately but quickly and make the needed changes. If you cannot make all the needed changes at the same time, make those that you can as soon as you can.
- You will get complaints from some customers about their bills going up. In my experience, most of the time, when the math is laid out for all to see, most people are understanding. Cost-to-serve rate analysis does not arrive at unfair rates. It arrives at fair rates. The degree by which some customers' bills will change highlights the fact that rates are unfairly structured right now.

Please keep the above summary of cost-based rate calculations in mind as you read on. But also keep in mind, you might never need rates as complex as what I develop when I use the full process described above. Something simpler may be quite appropriate for your situation.

Construction of the Models

Structurally and mathematically, the models are the same. All the basic data is the same, too. The only difference between the models is at what level will the utility be staffed and how much of the utility's costs must be paid by ratepayers and how much must be paid (subsidized) by the Business Council.

For modeling purposes, funds are shown in three kinds of accounts, but it does not matter in what account or accounts funds are actually held.

Several line graph charts in the models graphically depict some things which would be difficult to pick out of the tables. In all the charts, the **blue line** represents what would happen under the **recommended** rates and the **red line** under the **current** rates. Financial trends for the red lines are usually bad. Those for the blue lines are usually good, or at least better. Review the definitions section of the Full Staffing, Stop Subsidies Model to learn the meaning of terms used in the charts. Definitions were left out of the other models to keep the report shorter.

I will say it simply, like this. Chart 8 depicts reserve levels under the existing rates (red line) and the modeled rates (blue line). When the blue line goes up, that is a good thing for the utility. When the red line goes down, that is a bad thing, at least, if you decide to keep your current rates and the rate at which you collect those bills. If either line is headed down toward zero, that is a very bad thing that needs to change by reducing costs, if you prudently can, or increasing rates.

In contrast to Chart 8, Charts 3 and 4 in the models depict user rates. When the Chart 3 and 4 blue lines go up, meaning rates are going up, customers don't like that. But the utility will be better funded as a result of those higher rates. That benefits ratepayers because it makes their utility more resilient and financially able to make repairs and improvements that will serve them better.

One thing you will notice in viewing the charts in the models is this. Sometimes, only one of the lines shows up. When that occurs, it means that all the lines are taking the same path (one line is covering up the others). For example, sometimes Chart 5 shows only one line – the working capital goal amount. When that happens both the current rates and the modeled rates' net revenues are adequate to satisfy the goal, so those two lines are hidden by the line for the goal. That is because, in the models, I programmed all funds that exceed what is needed to meet the working capital goal to "spill over" into the CIP and Debt Service fund reserve. When that happens, rest assured, the other two lines are underneath the goal line and that is a good thing.

Charts 6 and 7 can do the same thing, making it seem like the current rates are "just as good as" the modeled rates. But, Chart 8 will spell the difference between the two sets of rates. The modeled rates will generate more revenue and, thus, produce stronger total reserves. Since the working capital reserve gets truncated at a certain level, the differences in the total reserves show up in the CIP and Debt Service fund balances. These balances appear near the bottom of Table 17, page 61, and they are included in the Chart 8 amounts on page 67.

As you set and later reset rates, I suggest you follow the guidance I give in my book, "How to Get Great Rates," available from my Website. I also suggest you use the "Replacement Scheduler©" spreadsheet for future equipment replacement scheduling. The book, the spreadsheet and other tools are all free downloads from https://gettinggreatrates.com/freebies/freebies.shtml.

Principles

I use several guiding principles when I help systems set their utility rates, fees and policies. As you read the report and models, keep in mind that my recommendations have been weighed against these principles:

1. Water, sewer and all other utilities are businesses, regardless of who owns them. Businesses must cash flow properly. Otherwise, they go out of business and your customers, even the non-paying ones, do not want that.
2. In addition to functioning in a business-like manner, a utility has a responsibility to its customers to strive to guarantee its long-term prosperity for their benefit. The customers expect the service to be there whenever they want to use it. Thus, a utility must err on the conservative side by building and maintaining strong reserves that will enable it to weather financial storms.

3. If a service costs the utility money, the utility should recover that cost from the most logical "person" if that makes good business and community administration sense. For example, generally "growth should pay for growth." Developers should fairly pay for their consumption of utility capacity by paying commensurate system development fees. Likewise, service users should pay for what they use. Each user or class of users should pay their fair share of service costs.

4. Sometimes contradicting point 3 above, if adjusting a rate, fee or policy will turn currently "good" customers into "bad" customers, or discourage development that you desire, consider the necessity of the change carefully before making it. For example, while it may be warranted, raising the minimum charge markedly to your residential customers may make it very difficult for fixed, low-income customers to pay their utility bill. That may cause more of them to pay late or not pay at all. That may trigger collection letters to those customers and eventually require shutoff of service. Thus, in the attempt to generate more net revenue by raising rates, net revenues may go down due to non-payment and payment collection costs. Likewise, stifling development with uncompetitive system development fees costs a utility in the form of additional paying customers. That forces existing customers to pay all the costs of the utility rather than sharing them with new customers.

You used to have what amounted to a bill assistance program. It was based on three criteria:

1. Being enrolled in the Tribe,
2. Being a senior and, frankly,
3. Failure to bill and/or acceptance of insufficient or even no payment of bills by those customers who chose not to pay.

A good case can be made for criteria numbers 1 and 2. Criterion number 3 is just not appropriate.

I suggest you read the bill assistance chapter in the "Rate Setting Issue Guide" mentioned earlier. You may want to adjust your current program to better help those who need it and not help those who do not.

For the techie reader, the analysis model we use – a Microsoft Excel spreadsheet application we call, "CBGreatRates" – is usually 3.8 mega-bites in size. Each rate analysis includes one of these sheets.

For a 1,000-connection utility, for example, we use another spreadsheet, 12.1 mega-bites in size, to sort and calculate customer volume use. We use one of these sheets for each rate class. There are usually five or so for the simplest rates. Each of these sheets is linked to the client's usage data file, usually a few mega-bites in size, for importing usage data. Thus, an analysis for a 1,000 connection utility totals 65 or so mega-bites in size.

For some of our larger client utility with more rate classes and more customers, total size of all the linked spreadsheets runs over 250 mega-bites. We run computers with lots of RAM and memory but some of the calculations for larger utility can take around 90 minutes to run. When usage data sheet runtimes get long, we usually switch to a database format application to speed up the heavy number crunching.

The Modeled Rate Structures

I almost always recommend, for all classes of customers, meter size-based minimum charges to recover fixed costs and unit charges to recover variable costs. You have such a structure for commercial customers, and I recommend you continue with that kind of structure for commercial customers. You do not desire such a structure for residential customers, so in the following, I will discuss the structure I would recommend along with the structure you desire.

Your current rates are a mix of structures. Some customers, mostly commercial customers, are billed a minimum charge plus unit charges on the volume they use, as determined by metering. For unit charges, they pay less for lower volumes of use and more as their use rises. These are commonly called, "conservation rates" because they encourage conservation.

I promote conservation rates in locales and situations where they are beneficial, like yours. Unfortunately, your usage data and billing practices make it impossible to accurately design such a structure with any certainty that those revenues would actually appear. Therefore, I calculated a level unit charge. The same unit charge rate would apply to every 1,000 gallons of use, and there would be no usage allowance (free volume). You may continue with a conservation rate structure for these customers, but to be more conservative, I assumed a level unit charge.

As to residential customers' rates, I had previously included discount for seniors and enrolled Tribe members to match structures you had in the past. Those "classes" continue in the new modeling, but I set all residential customers' bills to be the same.

It is my understanding you have some residential customers that are metered and others that are not. I assumed all would pay the same flat rate, at least initially.

The base cost-to-serve minimum charge and the base unit charge are developed from cost classification done in Table 8, page 52. To the base fixed cost per customer per month is added a capacity surcharge developed in Table 15, page 59. And, unit charges are calculated in Table 10, page 53, to recover the balance of revenues needed to fully fund the utility. This is the foundation for metered commercial rates. It is also the foundation for calculation of the residential flat fees.

All these rates are presented in Table C, page 31.

Full Staffing, Stop Subsidies Model Discussion

Introduction

In this section, I discuss issues at some length. Most of what I describe in this section applies to the next sections, too. You may assume that issues discussed here apply in the next sections, unless I state otherwise. Issues that are different in the following sections discussed thoroughly there. I organized the report in this way to shorten and simplify it because, other than the staffing level, subsidies and their effects, the models are the same.

In the Full Staffing, Stop Subsidies Model, the average rate increase needs to be 189 percent. That shows at the top of Table 18, page 62. That increase is misleading because the comparison is between the test year rate revenues collected and the rate revenues that would be generated by the modeled rates. During the test year, not all water was billed for and not all bills assessed were collected.

I will now cover several issues in detail.

Capital Improvements, Debt and Repair and Replacement

Capital improvement and repair and replacement planning are discussed at length in Chapter 13 of the "Rate Setting Issues Guide." That chapter also gives guidance on how to use the related spreadsheets.

I originally thought that a big driver of the need for higher rates and stronger bill collection will be capital improvements. Past engineering reports indicated that. My experience indicates that.

However, David Myer, your consulting engineer informed me that you have received funding commitments on nearly all of the system improvements you have applied for. And you have been issued or committed grant funding for all but approximately $150,000 of those needs. Thus, capital improvement program (CIP) needs are a non-issue when it comes to user charge rates.

In Table 5, page 49 of the Full Staffing, Stop Subsidies Model, I included CIP and debt needs.

Equipment Repair and Replacement

NAWSD does not have a formal equipment repair and replacement (R&R) schedule. NAWSD does not save to pay for R&R costs as they come along. NAWSD should start doing both.

Because there is no R&R schedule to incorporate into the Model, I assumed R&R at a rather token annual cost of five percent of annual operating costs, less the cost of administration and capital improvements. This is shown in Tables 6 and 7, starting on page 50. I find most systems with a few decades of age on them run up R&R costs at about 15 percent of operating costs.

System Development Fees and Capacity Surcharges

The engineering reports foresee strong growth. New connections to the water system should pay for the cost of connecting them and "signing them up" as new customers. They should also pay at least a small percentage of the cost incurred to build the capacity to serve them.

Capacity costs can be recovered in two main ways: system development fees and capacity surcharges to the minimum charge. Most of the math for either fee is the same, so both are discussed in this subsection. And, these fees are discussed at length in Chapter 12 of the "Rate Setting Issues Guide."

These two types of fees will, unfortunately, add complexity to your rates. I would prefer to keep your rates simpler. But these fees emphasize a fact that I think needs to be an important part of the message you give to your customers. That is, NAWSD incurs costs to provide water service to them. They should reimburse NAWSD for those costs on a fair basis.

To pay for part of the coming improvements and debt costs, I assumed you would assess and collect system development fees and minimum charge surcharges, later just called, "SDFs" and "surcharges." These fees should be based on meter size for commercial customers, as further described here:

1. You should assess SDFs that recover as much of the peak capacity costs as possible, while keeping the connection fees reasonably competitive with those of other water systems in the area. (SDFs are the only important fees where I suggest competing with other systems' fees.) I set the SDF for the smallest sized meter at $1,000. This base cost is calculated in Table 11, page 55. (That table shows that recovery of peak flow capacity costs by SDFs will still be quite low.
2. Larger meter sizes would be assessed higher system development fees based upon the maximum sustainable flow rate of each meter as determined by flow studies done by the American Water Works Association. Those capacity "shares" are shown in Table 12, page 56.
3. In the calculation of SDFs, I included no out of pocket costs NAWSD incurs for equipment and supplies NAWSD uses or supplies when making new connections. Essentially, these are separate fee for service propositions, so you should recover out of pocket costs, and at least come close to recovering costs of new connection-related services, in addition to collecting the calculated SDFs.
4. Even though revenue generation from these fees is not a major issue, the important reason for assessing meter size based SDFs is to charge each new customer or developer proportionately for what they get from the utility. That is capacity to serve the property. Capacity to serve is related to the size of the meter. In addition, you should be ***seen*** by all ratepayers as attempting to recover costs from each based upon the costs that each causes the utility to incur.

5. The same thing applies to minimum charge surcharges. SDFs and surcharges do the same thing – they recover capacity costs. The difference between the two is, SDFs recover those costs "up front," while surcharges recover them over time. Or to say it very simply, development fees buy capacity with cash and surcharges buy capacity on "the easy payment plan."

As shown on the left-hand side of Table 11, page 55, between SDFs and system development surcharges, I modeled rates that will recover just a bit more than 25 percent of system development costs. The rest will be recovered by regular user charge fees.

The Full Staffing, Stop Subsidies Model calculated SDFs from the smallest customer meter to an eight-inch meter. I recommend you adopt this set of fees, if allowed, and as a matter of policy, you should let the standard fees for all meter sizes below a chosen size be controlling. In other words, let NAWSD staff handle the "retail stuff" of small meter new connections. I suggest that all connections with meters of two inches or less be paid for off the system development fees table you adopt. Almost all larger meter connections should be handled that way, as well.

However, the Tribe has and should, when warranted, exercise its prerogative to accept (grant a variance for) new connections for some other system development fee amount and/or for other considerations offered by a potential new customer. Translation: if you are willing to negotiate fees to bring in a big employer, for example, that is your call. Most commonly, the issue will be economic development and job creation by a new customer needing a large meter size.

There can be service areawide benefits to allowing such new customers to build or expand in the service area, at a discounted fee, that outweigh the reduction in SDF revenues. Just be careful about giving up too much in the hope that it will bring greater benefits to all other customers, and NAWSD. Often, the discounting-for-economic-development strategy does not pan out.

System Development Fees

In this report and elsewhere, you will see the terms "tap fee," "tap-on fee" and "connection charges." There are other names for these and similar fees. I call these, "system development fees."

Most small systems set such fees anecdotally, and almost always too low, as well. They almost never attempt to recover the full cost of the infrastructure capacity they dedicate to each customer when they authorize them to "tap on." Rarely do they even have much of an idea what that capacity costs.

Failing to assess development costs to development is a problem because with each dedication of capacity to customers, the capacity of the utility gets "used up." That hastens the day when new capacity must be built. If that capacity cost is not assessed to those who cause it, it will be assessed by default to all customers. That forces existing customers to subsidize development, and that is a rate structure fairness issue.

I recommend you handle system development costs with a combination of system development fees and surcharges to minimum charges based upon meter size. **And, in your ordinances and elsewhere: call new connection charges by the name, "system development fees."** This descriptively tells developers and new customers what they are paying for. It is not just an arbitrary fee. They are actually buying something of great value. Then, **assess as much of the full cost of system development as you can and still be competitive with comparable systems.**

Later in this report when you see "tap-on fee" and those other terms, think, "system development fee." And when you talk with customers and others about this fee, make sure they know this is not just "government assessing another kind of tax." This is a utility having customers fairly pay for what they are buying – capacity to serve them.

I recommend you assess the same system development fee to three-quarter inch and smaller meters because these are the most common meter sizes for residential customers in most systems. (In fact, I assumed all residential customers are served by these meter sizes.) Setting the same SDF for these meter sizes and this class of customers will simplify administration of the system development fee program. To make minimum charges consistent with the SDF structure, you should assess minimum charges on a meter size basis, as well. The rates I recommend at the end of this section are set up in that structure.

Unbilled-for Water

The term, "unbilled-for water" is usually used to describe true water loss through leaks in the system, plus water used for line flushing and plant maintenance, water supplied for free to administration buildings and others, water stolen by the occasional user who secretly tapped into a distribution main, and similar situations. Rarely does the term apply to water that a system supplies to customers for which the system simply does not bill. But that has occurred in your situation.

As to supplied but not billed-for water, you should stop that practice once you discover such connections.

- The first and best option to do that is to start billing and collecting fees from such customers – turn them into paying customers. They need the water and you need the revenue.
- The worst option, but it may be necessary in some cases, will be to disconnect those customers that do not pay for the service. Water given to customers still costs NAWSD money, at least on a marginal cost basis. By cutting non-paying customers off, you can save at least your marginal costs and that will benefit the finances of NAWSD and the Business Council.

Based upon data in the engineering reports, I assumed 40 percent of your potential revenue goes unpaid-for. That is greater than the 75 percent unpaid bills so far over the last two months, but I expect that to improvement markedly. I assumed you would begin collecting 35 of those 40 percentage points of assumed uncollected fees from customers as follows:

- Five percent more starting in 2020,
- Ten percent more starting in 2021,
- Ten percent more starting in 2022,
- Ten percent more starting in 2023,
- From 2024 and beyond, you would not turn anymore unpaid customers into paying customers. Additional revenues from these newly paying customers during those years would just reflect inflationary rate increases.

I will grant that these estimates may seem to be optimistic, considering NAWSD's rates history. The rates needed to fund the water system will be high on an affordability basis, especially for some low-income customers. The dollar amounts to be collected from these newly paying customers are substantial, presenting a risk of revenue shortfalls if these revenues do not come in. But these things all point to the fact that non-paying customers are a serious burden for paying customers and the Business Council to support. Almost every other water system manages "slow-pays" and "no-pays" down to a low single digit non-payment level. I hope you can, too.

Unbilled-for water costs money; not at the full unit charge rate I calculated, but at a substantial portion of that rate. Line replacements in the improvement plans will fix some leaks. You should seek out other leaks and repair those that are large enough to warrant the investment to fix them. In other words, in a reasonable time the fix would pay for itself in cost savings. I recommend you contact the Wyoming Association of Rural Water Systems https://www.warws.com/ to have them, at no charge, help you find leaks. They are experts at that and many other things.

"Daisy-chained" Connections

A "daisy-chained" connection is one where a home or business is connected to the NAWSD distribution line. Another home or business is then connected to the first home or business, not the NAWSD distribution line. Commonly, such connections are not independently metered.

The engineers discussed daisy-chained connections. I concur with their view: daisy-chained connections introduce backflow and water loss risks and make it harder to collect for non-payment. They are legally "messy." They also cause rate structure fairness problems whether you assess a minimum charge to the daisy-chained customers or not.

The safest and fairest approach is to not allow daisy-chained connections. When you find them, you should run distribution lines to them, install a meter for them, disconnect the daisy-chained connection line and bill each customer directly. The physical connection and the relationship you have with each customer should be direct. There should be no customer or connection in-between NAWSD and its customers.

To be clear, a retirement home with multiple buildings on its site that are plumbed by the owner, or a strip shopping center where you deliver water to the owner of the center and they plumb water to each shop are not daisy-chained connections. In such situations, your customer is the owner of the retirement home or the owner of the strip shopping center. Those are the people you bill. They then deal with their residents or renters however they like.

In other systems where non-payment is well controlled, I would recommend that they bill daisy-chained customers like this. Bill only the connection that is served by the utility's water meter and bill them for all the water that passes through that meter. Let that customer collect or not collect fees from their daisy-chained "customers" or not, as they please.

In your situation, non-payment is a problem and billing as just described would likely cause more non-payment. It would be better to fix the problem by making direct connection with each customer.

Target Reserve Levels

NAWSD might have some cash reserves but because the Business Council has been subsidizing it for years, for all practical purposes, it has none. Therefore, I assumed no starting reserves. And I also assumed the Business Council would not look to NAWSD to recover any of the subsidies it has given NAWSD over the years.

Most systems serving fewer than 5,000 connections, including yours, should have reserves at least as high as the sum of the following:

1. Unobligated cash and cash equivalent reserves equal to at least 35 percent of the annual operating costs, not including debt service and general administration costs. *I recommend 50 percent in your case because your utility is small. That reserves goal shows in the bottom left corner of Table 4, page 48;*
2. A 20-year repair and replacement (R&R) schedule reserve, in the 20th year equal to at least one average year's cost of R&R, and
3. Capital improvement and debt reserves at the end of the tenth year, after debt is paid, equal to that year's debt payments plus cash-paid capital improvement expenses.

The lines on the bottom of Table 17, page 61, and several of the charts at the end of the Model show your reserve balances expected for the next ten years. The last line of Table 17, the "Sum of All Reserves," is the critical one.

You are projected to have positive but rather low total reserves for the next few years, but that will improve nearly every year. By the tenth year, reserves will be quite adequate.

Projecting budgets and ending balances for next year is difficult. Doing the same five years out, I can usually get close, though I don't want to over encourage, given your situation. Ten-years out, there are so many assumptions we must make now that will not pan out years from now that you should not bank on those numbers. But they serve as good planning targets. In most cases, a utility will see big cost, income, growth, debt and other changes looming on the horizon a few years out. When that happens, it is time to do a new rate analysis to get rates back on track to meet those challenges. Thus, target balances give you something to aim for, but the target will move a lot over time. With each new rate analysis, we will bring you back on course.

In your case, if you do the system improvements in the engineering reports and you work on reducing your unbilled-for water, you should have me do an annual update (not a full rate analysis) of the rates model you end up choosing. That way we can make adjustments to the model based upon what ends up happening over the next few years and you can reset rates accordingly. Eventually, a full rate analysis will be in order, but updates should keep you on track for several years.

Rate Affordability

Affordability will be a driving issue for how, and how high you set rates.

This issue is discussed at length in Chapter 3 of the "Rate Setting Issues Guide." Related to that, Chapter 4 discusses bill assistance programs. I rarely recommend such programs because most often, they require someone (other ratepayers) or some other entity (the Business Council) to subsidize the difficult-to-pay customers. In your case, however, you should look into it. Review the guide. Then, if you need more help, give me a call.

Rate affordability, often measured by the Affordability Index, is an important indicator to which you should pay attention.

> Affordability Index: The monthly charge for (typically) 5,000 gallons of residential service divided by the median monthly household income for the area served by the system. An index of 1.0, meaning a household pays one percent of its income to pay its bill for 5,000 gallons of service, is generally considered affordable. Affordability index is a primary factor in determining grant and loan eligibility and grant amount.

In Table 17, page 61, near the top, I show the estimated Affordability Index of the current bill for an enrolled Tribe member, small meter connection in the first column, at 0.49 percent. The Affordability Index of the modeled rates shows in the following column, at 1.40 percent. That, however, does not tell the whole story. That is a rather high Affordability Index, 1.0 percent or so being the national average.

Some customers have markedly lower household incomes than the Census data average. To depict that kind of customer, the next section in Table 17 shows the affordability "index" of a low-volume, low-income customer. These results also show in Chart 4. Bills for such customers are now, and in the future will be significantly less affordable than the "average" customers' bills because, under a flat fee rate structure, they pay the same bill as all other residential customers, but they have only half as much household income with which to pay that bill. That is one of the important functions of metered rate bills – lowering the bills of low-volume customers.

While these affordability indicators useful, one should take them "with a grain of salt." I averaged the median incomes data of Fort Washakie and Ethete to arrive at the estimated median household income and income growth rate for the NAWSD service area. This Census data may not be representative, and that data was quite different for the two service areas.

According to the same Census data with adjustments cited above, NAWSD service area incomes are projected to rise at a slower pace than the inflationary increases for rates. Therefore, the Affordability Index will rise in future years. That means, on a bill affordability basis, rates will grow to be less affordable with time. However, for most of my client utilities, that is the trend for them, too. The costs to provide water and sewer service are rising faster than incomes.

Adopt These Rates to Fully Staff and End Business Council Subsidies

The Model is complex, components of the rates and fees are calculated and shown in different tables of the Model and the Model does not spell out policy issues. Therefore, I have summarized most of my findings and recommendations as follows:

1. You should assess the flat fees, system development fees, monthly minimum charges and unit charges as shown in Table C, that follows this list. These rates will move you closer to a cost-to-serve structure.

As to system development fees:

   a) I recommend that almost all new connections, especially all those made with water meters two inches in diameter or less, be paid for at the rates included in the new system development fee rate table you will adopt. Ideally, larger meter system development fees would be paid for in that way, too. However, the Tribe retains the right to waive the standard system development fee or adjust that charge for certain larger meter size customers that, due to other offsetting values they would bring to the service area (primarily economic development) that would substantially benefit NAWSD and its customers.

   b) Continue to bill for equipment and services that NAWSD provides to facilitate making new connections. Call these whatever you want but be clear that these charges are to pay for materials, supplies and services you sell to owners of developing properties. These are separate from system development fees that pay for capacity dedicated to new customers.

2. The calculations assumed you would have made these adjustments early enough to enable you to collect at these rates for the January 1, 2020, billing. You would need to satisfy all Tribe and/or statutory requirements for making rate adjustments in advance of the adjustment date. That is coming up soon, so if you want to make that date, you will need to move promptly. You could adopt rates that are only part way to the recommended rates but know that would delay the time when the utility could be self-supporting.

3. I recommend a late payment fee of $10.00 or ten percent of the outstanding total bill amount owed to NAWSD for all services provided, whichever is greater, each month. Note: I do not consider this to be a late payment "penalty." Rather, I consider it to be a fee assessed for providing lending services, extra billing services and taking on the risk of such customers not paying or paying late or in installments. I believe you should refer to it in similar terms, too. Some utilities call this a "payment convenience fee."

   a) The above fees are for "slow-pay" customers. Some may truly merit bill assistance, so I recommend you investigate adopt a bill payment assistance program.

4. If costs, incomes and balances accrue close to those I assumed in the Model, about one year after the initial adjustments and each year for about five years, you should raise all rates and significant fees by an average of 5.0 percent.

5. If balances do not accrue as shown at the bottom of Table 17, page 61, but they are not egregiously too low, follow the instructions in Chapter 9 of the book, "How to Get Great Rates" for how to calculate inflationary increases correctly. Or, you may simply call me to discuss the situation.

Table C: Recommended Fees and Charges to Fully Staff and Stop Subsidies

Table C: Northern Arapaho Water and Sewer Department Water Rates and Fees for Full Staffing and Stop Subsidies Model

Bill for Residential Customers Only, With No In-ground Lawn Irrigation System or Other High-volume Use Capacity

Residential Monthly Bill $58.55

Note: For connection fees for new residential construction, assess System Development Fee from following table.

Note: Require residential customers with an in-ground lawn irrigation system or other high-volume use capacity to pay rates from the following table.

Commercial Customers and Residential Customers With High-volume Use Capacity

Water Meter Size in Inches	Meter Type	System Development Fee	Minimum Charge	Usage Allowance in Gallons	Unit Charge per 1,000 Gallons
0.625	Displacement	$1,000	$21.66	0	$5.27
0.750	Displacement	$1,000	$21.66	0	$5.27
1.000	Displacement	$2,274	$26.17	0	$5.27
1.500	Displacement	$4,398	$33.68	0	$5.27
2.000	Displacement	$6,948	$42.69	0	$5.27
2.500	Displacement	$10,771	$56.20	0	$5.27
3.000	Singlet	$13,745	$66.72	0	$5.27
3.000	Compound, Class I	$13,745	$66.72	0	$5.27
3.000	Turbine, Class I	$15,020	$71.22	0	$5.27
4.000	Singlet	$21,392	$93.75	0	$5.27
4.000	Compound, Class I	$21,392	$93.75	0	$5.27
4.000	Turbine, Class I	$26,491	$111.77	0	$5.27
6.000	Singlet	$42,635	$168.83	0	$5.27
6.000	Compound, Class I	$42,635	$168.83	0	$5.27
6.000	Turbine, Class I	$55,380	$213.88	0	$5.27
8.000	Compound, Class I	$68,126	$258.93	0	$5.27
8.000	Turbine, Class I	$119,107	$439.14	0	$5.27

Full Staffing, Stop Subsidies Model Rates Discussion Closing

The rates calculated by the Full Staffing, Stop Subsidies Model are full-cost rates and close to a "cost-to-serve" structure, at least on a customer class basis for residential customers. That means NAWSD costs will (eventually) be fully paid for by its customers; the Business Council will eventually cease subsidizing the utility and each customer will pay rates that are close to the cost-to-serve them, with the exception of some residential customers.

Utilities should be self-supporting, but that has not been the legacy of NAWSD. Facing the need to change the water billing practices of the utility and bill collection from customers, becoming a self-supporting utility may not be in your immediate future. It may not be in your future at all. But I recommend you strive toward that goal.

Whether NAWSD reaches self-sufficiency or not, the Full Staffing, Stop Subsidies Model will give you a good idea of what it would take, in rates, to get there. And this Model will serve as the base against which you can compare whatever rates you may end up assessing and the dollar amounts by which the Business Council will need to subsidize the utility.

The circumstances within NAWSD and the Riverton region generally will change over time. Just because you may not reach self-sufficiency immediately under your current conditions does not mean it will never be possible.

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Low Staffing, Stop Subsidies Model Discussion

Introduction

This rates model keeps staffing where it is now, and it stops subsidies from the Business Council. That affects the calculated rates and a few other things, but most data and results are the same as in the Full Staffing, Stop Subsidies Model. Therefore, in this section, I will only discuss those things that are different.

In this Model, the average rate increase needs to be 127 percent.

Rate Affordability

In Table 17, page 72, near the top, the Affordability Index of the modeled rates is 1.06 percent. As compared to the national average of approximately 1.0 percent, these rates are quite close to that.

Adopt These Rates to Inadequately Staff and End Business Council Subsidies

1. Instead of adopting the rates from Table C, adopt the rates from Table D, that follows this list. Otherwise, all other recommendations on pages 30 and 31 apply here, too.

Table D: Recommended Fees and Charges to Fully Staff and Stop Subsidies

Table D: Northern Arapaho Water and Sewer Department Water Rates and Fees for Low Staffing and Stop Subsidies Model

Bill for Residential Customers Only, With No In-ground Lawn Irrigation System or Other High-volume Use Capacity

Residential Monthly Bill $44.55

Note: For connection fees for new residential construction, assess System Development Fee from following table.

Note: Require residential customers with an in-ground lawn irrigation system or other high-volume use capacity to pay rates from the following table.

Commercial Customers and Residential Customers With High-volume Use Capacity

Water Meter Size in Inches	Meter Type	System Development Fee	Minimum Charge	Usage Allowance in Gallons	Unit Charge per 1,000 Gallons
0.625	Displacement	$1,000	$16.97	0	$3.94
0.750	Displacement	$1,000	$16.97	0	$3.94
1.000	Displacement	$2,274	$21.47	0	$3.94
1.500	Displacement	$4,398	$28.98	0	$3.94
2.000	Displacement	$6,948	$37.99	0	$3.94
2.500	Displacement	$10,771	$51.51	0	$3.94
3.000	Singlet	$13,745	$62.02	0	$3.94
3.000	Compound, Class I	$13,745	$62.02	0	$3.94
3.000	Turbine, Class I	$15,020	$66.52	0	$3.94
4.000	Singlet	$21,392	$89.05	0	$3.94
4.000	Compound, Class I	$21,392	$89.05	0	$3.94
4.000	Turbine, Class I	$26,491	$107.07	0	$3.94
6.000	Singlet	$42,635	$164.13	0	$3.94
6.000	Compound, Class I	$42,635	$164.13	0	$3.94
6.000	Turbine, Class I	$55,380	$209.19	0	$3.94
8.000	Compound, Class I	$68,126	$254.24	0	$3.94
8.000	Turbine, Class I	$119,107	$434.44	0	$3.94

Full Staffing, Stop Subsidies Model Rates Discussion Closing

I recommend ending the subsidies, but I do not recommend under-staffing utilities. However, these rates would be a bit lower than the full cost, no subsidy rates.

***

Full Staffing, Keep Subsidies Model Discussion

Introduction

This rates model increases staffing, and it keeps subsidies from the Business Council in place. That affects the calculated rates and a few other things, but most data and results are the same as in the Full Staffing, Stop Subsidies Model. Therefore, in this section, I will only discuss those things that are different.

In this Model, the average rate increase needs to be 68 percent.

Rate Affordability

In Table 17, page 82, near the top, the Affordability Index of the modeled rates is 0.75 percent. As compared to the national average of approximately 1.0 percent, these rates are much lower.

Adopt These Rates to Fully Staff and Keep Business Council Subsidies

1. Instead of adopting the rates from Table C, adopt the rates from Table D, that follows this list. Otherwise, all other recommendations on pages 30 and 31 apply here, too.

Table E: Recommended Fees and Charges to Fully Staff and Keep Subsidies

Table E: Northern Arapaho Water and Sewer Department Water Rates and Fees for Full Staffing and Keep Subsidies Model

Bill for Residential Customers Only, With No In-ground Lawn Irrigation System or Other High-volume Use Capacity

Residential Monthly Bill $31.36

Note: For connection fees for new residential construction, assess System Development Fee from following table.

Note: Require residential customers with an in-ground lawn irrigation system or other high-volume use capacity to pay rates from the following table.

Commercial Customers and Residential Customers With High-volume Use Capacity

Water Meter Size in Inches	Meter Type	System Development Fee	Minimum Charge	Usage Allowance in Gallons	Unit Charge per 1,000 Gallons
0.625	Displacement	$1,000	$12.53	0	$2.69
0.750	Displacement	$1,000	$12.53	0	$2.69
1.000	Displacement	$2,274	$17.03	0	$2.69
1.500	Displacement	$4,398	$24.54	0	$2.69
2.000	Displacement	$6,948	$33.55	0	$2.69
2.500	Displacement	$10,771	$47.07	0	$2.69
3.000	Singlet	$13,745	$57.58	0	$2.69
3.000	Compound, Class I	$13,745	$57.58	0	$2.69
3.000	Turbine, Class I	$15,020	$62.09	0	$2.69
4.000	Singlet	$21,392	$84.61	0	$2.69
4.000	Compound, Class I	$21,392	$84.61	0	$2.69
4.000	Turbine, Class I	$26,491	$102.63	0	$2.69
6.000	Singlet	$42,635	$159.70	0	$2.69
6.000	Compound, Class I	$42,635	$159.70	0	$2.69
6.000	Turbine, Class I	$55,380	$204.75	0	$2.69
8.000	Compound, Class I	$68,126	$249.80	0	$2.69
8.000	Turbine, Class I	$119,107	$430.00	0	$2.69

Full Staffing, Keep Subsidies Model Rates Discussion Closing

I do not recommend under-staffing utilities, so this alternative is better than the previous, but it also retains the Business Council subsidies. However, due to the continuing subsidies, these rates would be much lower than the full cost, no subsidy rates.

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Low Staffing, Keep Subsidies Model Discussion

Introduction

This rates model keeps staffing low, and it keeps subsidies from the Business Council in place. That affects the calculated rates and a few other things, but most data and results are the same as in the Full Staffing, Stop Subsidies Model. Therefore, in this section, I will only discuss those things that are different.

In this Model, the average rate increase needs to be 5.1 percent. Residential bills would actually go down about five percent, but commercial customer bills would go up by more, resulting in a net bill increase.

Rate Affordability

In Table 17, page 92, near the top, the Affordability Index of the modeled rates is 0.41 percent. As compared to the national average of approximately 1.0 percent, these rates are markedly lower and they are lower than the rates you recently adopted ($20.00 per month for residential customers).

Adopt These Rates to Inadequately Staff and Keep Business Council Subsidies

1. Instead of adopting the rates from Table C, adopt the rates from Table F, that follows this list. Otherwise, all other recommendations on pages 30 and 31 apply here, too.

Table F: Recommended Fees and Charges to Inadequate Staff and Keeping Subsidies

Table F: Northern Arapaho Water and Sewer Department Water Rates and Fees for Low Staffing and Keep Subsidies Model

Bill for Residential Customers Only, With No In-ground Lawn Irrigation System or Other High-volume Use Capacity

Residential Monthly Bill $17.34

Note: For connection fees for new residential construction, assess System Development Fee from following table.

Note: Require residential customers with an in-ground lawn irrigation system or other high-volume use capacity to pay rates from the following table.

Commercial Customers and Residential Customers With High-volume Use Capacity

Water Meter Size in Inches	Meter Type	System Development Fee	Minimum Charge	Usage Allowance in Gallons	Unit Charge per 1,000 Gallons
0.625	Displacement	$1,000	$7.82	0	$1.36
0.750	Displacement	$1,000	$7.82	0	$1.36
1.000	Displacement	$2,274	$12.33	0	$1.36
1.500	Displacement	$4,398	$19.84	0	$1.36
2.000	Displacement	$6,948	$28.85	0	$1.36
2.500	Displacement	$10,771	$42.36	0	$1.36
3.000	Singlet	$13,745	$52.87	0	$1.36
3.000	Compound, Class I	$13,745	$52.87	0	$1.36
3.000	Turbine, Class I	$15,020	$57.38	0	$1.36
4.000	Singlet	$21,392	$79.91	0	$1.36
4.000	Compound, Class I	$21,392	$79.91	0	$1.36
4.000	Turbine, Class I	$26,491	$97.93	0	$1.36
6.000	Singlet	$42,635	$154.99	0	$1.36
6.000	Compound, Class I	$42,635	$154.99	0	$1.36
6.000	Turbine, Class I	$55,380	$200.04	0	$1.36
8.000	Compound, Class I	$68,126	$245.09	0	$1.36
8.000	Turbine, Class I	$119,107	$425.30	0	$1.36

Low Staffing, Keep Subsidies Model Rates Discussion Closing

I do not recommend either attribute of these rates. It under-staffs the utility and customers to not pay even that inadequate cost. However, these rates are much closer to the current rates, so they serve as an indicator of where the current rates will take the utility and the Business Council.

***

Conclusion

"Conclusion" is a misnomer here. This report provides information upon which NAWSD can make decisions. Thus, it begins the process by which you will initially adjust rates and fees and take other actions to move the utility toward full-cost, cost-to-serve rates.

I was not engaged to consult with you beyond the close of the project. However, please feel free to give me a call or send me an e-mail anytime. If the issue is fairly easy to explain on the phone or by e-mail reply, and many are, I will do that for no extra fee. If the issue is complex enough to require much modeling revision, I will estimate the time and cost that it will entail and let you decide if you want me to do that additional work. Other clients occasionally have new conditions appear a year or two after their analyses were completed. I can usually model and report on most changes in a half-day to a full day, which costs about $500 to $1,000. It's pretty cheap insurance to make sure you stay on track.

I also offer this advice as you take on the rate adjustments. Everyone impacted by NAWSD's water rates should at least be made aware of the results of this report.

- I normally recommend to clients, that as they apply for grants and loans to fund the improvements, they include a copy of this report with their application. In your case, I recommend you NOT include this report with such applications. You are having more grant acquisition success than I have ever heard of before, so keep doing what you are doing. It is working.
- My default recommendation is that you give any customer as much information as they want. If they want a copy of the full report, give them that.
- Give the media a copy of the full report, so they can quote the report directly and accurately rather than be forced to "figure things out." Much of this is very complex. Few people know how to, or have the time to, calculate utility rates. Make it easy for everyone to get the facts right.
- Most customers are focused on what would happen to their bills. To satisfy those information needs, NAWSD can publicize the current and recommended rates and/or the bill comparisons table from the Models.
- A few customers will want to know more, especially high-volume customers. Give them the full report, if that is what they want.

- A good way to accomplish these things is to post the full report on NAWSD's Web site so everyone can see for themselves what the report says. Give everyone a link to that site. Publicize the Web posting(s) widely and publicly. Information is a good thing. ***Being seen as*** trying hard to get information out to folks is also a good thing.

Before long, you will continue your rate setting efforts without me. But I am still around. Give me an update once in a while. I like to know how my past clients are progressing.

And anytime in the future, if you have a question, call or e-mail me. The best-case scenario is, your issue will be easy to solve and describe to you, and I will do that at no charge. The worst-case scenario is, your issue requires more work, in which case I would propose fees for it. You can then accept or not. But if an issue requires much work, that will mean that the issue is quite important and worth solving based on good information. In my view, that is a best-case scenario, too.

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This model assumes full staffing of the utility and subsidies from the Business Council will cease by 2024.

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Note: This document is a print out of the spreadsheet model used to calculate new user charge and other rates and fees for the next 10 years. These calculations are complex and are based upon many conditions and assumtions. These issues, and others, are described in a narrative report that accompanies this model.

Index of Tables and Charts

Note: When a numbered table or chart listed below is not in the package, that was not a mistake. It simply means that table or chart from our master program was not needed in this situation so it was left out to prevent confusion.

Definitions

Affordability Index	The monthly charge for (typically) 5,000 gallons of residential service divided by the median monthly household income for the area served by the system. An index of 1.0, meaning a household pays one percent of its income to pay its bill for 5,000 gallons of service, is generally considered affordable. Affordability index is often a factor in determining grant and loan eligibility and grant amount.
Analysis Year	The year following the "test year." Generally, rate analysis is done during the year following the "test year" and intial rate adjustments are done later still during the analysis year or sometime during the following year once the analysis shows how rates should be adjusted. See related "test year."
Capital Improvement Plan or Program (CIP)	A schedule of anticipated capital improvements. These are the more expensive items such as treatment plants, lines and other expensive infrastructure that generally requires bond or grant funding.
Capital Improvement Reserves	Cash reserves dedicated to funding the CIP
Comprehensive Rate Analysis	A thorough examination of a system's operating, capital improvement, equipment replacement and other costs, revenues, current rates, number of users and their use of the system, growth rates and all other key issues surrounding the system. This examination will determine how rates and fees should be set in the future to cash-flow the system properly, to build appropriate reserves and to be fair to ratepayers. It also will determine how policies should be adjusted to enable the system to operate well now, operate well in the medium-range future (about 10 years) and prepare for expected and expectable events such as capital improvements and equipment replacement.
Connection Charge	See system development fee
Conservation (Inclining) Rates	Unit charges that go up as the volume used goes up
Cost to Produce	There are several ways to define and calculate cost to produce. Each is acceptable for different purposes. Generally, cost to produce is the total of all variable costs required to get service to a utility's customers during one year divided by the total units of service delivered during that year. This calculation will yield the average cost to produce. In a proportional to use rate structure, this is the unit charge. See "Cost Calculations" at the bottom of Chart 19.
Cost to Serve Rates	Rates where fixed and variable costs generated by each user class are paid by that class with minimum and unit charges, respectively. Similar to and sometimes the same as "proportional to use" rates.
Cost Types; Fixed and Variable	The two main types of costs are fixed - those that are related to the fact that someone is a customer; and variable - those that are related to the volume of the commodity delivered to customers. Generally, fixed costs should be recovered with minimum charges and variable costs with unit charges.
Coverage Ratio (CR)	Incomes available to pay debt divided by the amount of the debt for that year. Most systems should have a CR of 1.25 or higher.
Current Position	For purposes of this report, for one year, the sum of all incomes and undedicated reserves minus all current financial obligations for that year. Future obligations (next year's loan payments) and depreciation are not included. Current position is a good measure of overall financial health.
Declining Rates	Rates where unit charges go down as the volume used goes up
Flat Rates	Rates where all users pay exactly the same fee regardless of the volume of service they use
Equivalent Dwelling Unit (EDU) or Equivalent Residential Unit (ERU)	Based upon number of water using fixtures, average flow, potential flow or similar criteria; the consumption rate of the average single family home is rated at one EDU. All other types of customers are then compared on this measuring basis and the EDUs are calculated. Generally the purpose of this exercise is to calculate fees that each EDU must pay.
Incremental Rate Increases (Inflationary Increases)	Rate increases done, generally annually, following the initial rate adjustment. The usual goal of such increases is to keep the system's incomes on track to meet reserve targets. Rate structure fairness is a small issue, if it is an issue at all. Such increases are usually small, in the two to five percent per year range.
Initial Rate Adjustments	Rate adjustments done in follow up to the comprehensive rate analysis. Generally, the goal of such adjustments is to establish rates that cover the system's short-term expected costs and do it with a structure that is fair to ratepayers. Initial adjustments should be followed in subsequent years with incremental rate increases.
Inflow & Infiltration (I&I)	In a sewer system, water that gets into the collection system by way of illicit connections (inflow) such as gutter downspouts, plus leaks in manholes and sewer lines (infiltration)
Infrastructure	Most commonly thought of as the hard assets, such as buildings, treatment plants and lines needed to provide service to customers connected to the system. In reality, staff, software and other "soft" assets should be thought of as infrastructure, as well.

Definitions

Life-cycle Cost	The total cost to design, build, operate, maintain and eventually dispose of an asset. One asset may cost less to build but it may be more expensive to operate and maintain, yielding a higher total life-cycle cost.
Marginal Costs	The parts of a utility's costs that are unavoidable in the course of serving a particular customer, a group of customers, more volume to all customers or some other marginal use of the system. Such customer(s) or extra use could be added at a discounted but still profitable fee, if desired. Generally marginal costs are less than the average costs but when extra use requires a system upsizing, they can be greater. These costs are especially useful when considering selling service at wholesale or charging "snow birds" while they are away.
Operating Costs	Definitions and calculations vary. For rate setting purposes operating costs are costs incurred because a system is operated. Such costs are usually recovered primarily through unit charges.
Operating Reserves or Working Capital	Analogous to current position, this is the net revenues retained to fund operating costs during times when costs exceed incomes.
Operating Revenues	Revenues collected in the form of user fees and similar operating cost-related fees
Operating Ratio (OR)	Current incomes divided by current expenses, not including debt. An OR of 1.0 is "break even." Most systems should have an OR of 1.25 or higher.
Payback Period	In this case, time required for the investment made to get this analysis to return that investment through increased user and other fees
Potential Demand	The volume of service that a user could demand for a short period of time at full volume use. The potential demand limiting factor is usually the size of the customer's meter or service line.
Proportional to Use Rates	Rates where the minimum charge recovers all fixed costs, the unit charge recovers all variable costs, the unit charge is the same for all volume sold, and there is no usage allowance in the minimum charge. This rate structure is similar to and often the same as cost to serve rates.
Replacement Schedule	A timetable that describes equipment replacement and important repairs that are too infrequent and/or too expensive to cover as annual operating costs but not so expensive that they need to be covered as capital improvements.
Replacement Reserves	Cash reserves used to fund the Replacement Schedule
Return on Investment	In this case, the dollar amount or percentage of revenue gain enabled by this rate analysis. Related to payback period.
Snow Bird	A customer, usually residential, that goes away during part of the year. Most commonly, people of "means" who live in the north who "fly south" for the winter. But, this category includes everyone who is absent for a significant part of the year but returns to their permanent residence.
System Development Charge, or Fee	Fee assessed to pay for at least part of the cost to build system capacity. For purposes of this model, all charges related to connecting new customers will be "rolled together" into a system development charge, usually including a charge that buys a new customer system capacity. This combined charge may be a few hundred dollars for a residential customer, if little or no capacity costs are included, to many thousands of dollars for a large industrial customer with capacity costs included. Similar terms in common use include "tap-on fee," "connection fee or charge," "hook-up fee," "impact fee," "availability charge," and "capacity charge."
Test Year	The one year period from which data was gathered to be the basis of the rate analysis, which is usually the last completed fiscal year. See related "analysis year."
Usage Allowance	The volume, if any, that is "given away" with the minimum charge. Most systems give away no volume. Those that give away an unlimited volume have what are called "flat rates" - a minimum charge only.
User Fee, User Charge, User Rates	Fees assessed to customers for use of the system. Does not system development charges, late payment penalties or other types of charges.
Water Loss	Measured by volume or percent, the part of a water system's net water production that does not reach customers or is not billed to customers. This loss also includes billable volume lost due to under-registering customer meters.
Working Capital, Net Income	The amount left in the operating fund after paying all costs due during that month, year or other time period. Working capital of $0 is "break even." Related to "current position."
Working Capital Goal or Operating Reserves Goal	The desired operating fund reserve, in dollars or percent, at a stated point in time. Small systems (1,000 connections) generally should target 35 percent or greater. Larger systems can target a lower percentage. The goal for each system should be based upon the needs of that system and the risk the customers are willing to take.

Table 2 - Test Year Usage

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table shows usage by all customers during the test year.

Test year = the one-year period being analyzed starts: 1/1/2018

Date this scenario created: 6/24/2019

Residential meter readings per year: 12

Other customer readings per year: 12

Bills per year: 12

Customer, Rate Class or Meter Size	Volume Range Bottom (in Gallons)	Volume Range Top (in Gallons)	Count of Bills With ANY Use in Each Range	Use in Each Range in Gallons	Count of Bills That "Maxed Out" in Each Range	Volume of Bills That "Maxed Out" in Each Range	# of Customers That "Maxed Out" in Each Range	% of Customers That "Maxed Out" in Each Range	% of Total Use in Each Range
Ethete Enrolled Tribe Member Residential	0	9,999,999	4,596	32,172,000	4,596	32,172,000	383	42.6%	42.2%
			4,596	32,172,000	4,596	32,172,000	383	42.6%	42.2%
Ethete Senior Enrolled Tribe Member Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Ethete Non-enrolled Tribe Member Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Ethete Non-enrolled Tribe Member Senior Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Ethete Enrolled Tribe Member Commercial	0	9,999,999	288	2,400,000	288	2,400,000	24	2.7%	3.1%
			288	2,400,000	288	2,400,000	24	2.7%	3.1%
Ethete Non-enrolled Tribe Member Commercial	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%

Table 2 - Test Year Usage

Customer, Rate Class or Meter Size	Volume Range Bottom (in Gallons)	Volume Range Top (in Gallons)	Count of Bills With ANY Use in Each Range	Use in Each Range in Gallons	Count of Bills That "Maxed Out" in Each Range	Volume of Bills That "Maxed Out" in Each Range	# of Customers That "Maxed Out" in Each Range	% of Customers That "Maxed Out" in Each Range	% of Total Use in Each Range
Arapahoe Enrolled Tribe Member Residential	0	9,999,999	5,700	39,900,000	5,700	39,900,000	475	52.8%	52.3%
			5,700	39,900,000	5,700	39,900,000	475	52.8%	52.3%
Arapahoe Senior Enrolled Tribe Member Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Arapahoe Non-enrolled Tribe Member Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Arapahoe Senior Non-enrolled Tribe Member Residential	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
Arapahoe Enrolled Tribe Member Commercial	0	9,999,999	216	1,800,000	216	1,800,000	18	2.0%	2.4%
			216	1,800,000	216	1,800,000	18	2.0%	2.4%
Arapahoe Non-enrolled Tribe Member Commercial	0	9,999,999	0	0	0	0	0	0.0%	0.0%
			0	0	0	0	0	0.0%	0.0%
		Grand Totals:	10,800	76,272,000	10,800	76,272,000	900	100%	100%

Note: Many commercial customers are metered, pay unit charges based on the volumes they use and they use substantial volumes. However, for simplicity, all known metered volumes were attributed first, to residential customers at 14,000 gallons per month, with the balance of volumes attributed to commercial customers.

Table 3 - Operating Incomes and Basic User Data

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table depicts user statistics, customer growth, and system incomes and across the board "inflationary" style rate increases through the 10th year.

Annual Median Household Income (AMHI)

$48,594	Census Bureau estimate of AMHI for the year	2017
$47,750	Census Bureau estimate of AMHI for the year	2016
$844	AMHI growth during this time period	
1.77%	Simple annual income growth rate during this time period (used to project incomes into the future)	

Test Year Growth of Customer Base and Average Tap Fee Paid per Connection

1 Number of new connections made during the test year

$0 Average tap or installation fee assessed during the test year

This model is programmed for rates to be reset in the "Analysis Year," also called the "0 Year" column below (heading highlighted blue). Revenues will be collected at the now-current rates for the first part of the analysis year and the modeled rates for the last part of the analysis year. Thus, the revenues shown in the last column of that table are "blended" revenues; part collected at the old rates and part collected at the new rates. It was then assumed that all rate adjustments made after the initial (major) adjustment will be done annually on approximately the anniversary of the first adjustment. If rates will not be adjusted during the "0 Year," an adjustment (normally a revenue reduction) was calculated below to account for the late start in making the first adjustments.

Basic User (Customer) Data

(First year balances and incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Across-the-Board Rate Increases Projected for Years After the Initial Adjustment Year (1st Year)	N.A.	N.A.	N.A.	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
				The row above shows the rate at which user charge fees should be increased for each year beyond the initial rate adjustment year. Unless stated otherwise, these should be across-the-board increases to all rates and fees and that should continue until a new rate analysis is done.									
Average Number of Customers for the Year	N.A.	900	901	910	918	927	936	945	954	963	972	981	990
Customers Added or Lost (-) During the Year	N.A.	1.0	1.0	8.6	8.6	8.7	8.8	8.9	9.0	9.1	9.1	9.2	9.3
Customer Growth Rate (from Engineering Reports)	N.A.	0.11%	0.11%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%
Actual (Test Year) and Projected Volumes, in Gallons	N.A.	76,272,000	76,356,747	77,082,136	77,814,416	78,553,653	79,299,913	80,053,262	80,813,768	81,581,499	82,356,523	83,138,910	83,928,730
How User Charge Fees Were Calculated, Accounting for New Customers and Future Rate Increases													
Actual or Calculated Sales Revenues		$183,600	$184,839	$635,932	$674,072	$714,499	$757,351	$802,773	$850,920	$901,953	$956,048	$1,013,387	$1,074,165
Additional Sales Revenues From New Customers			$1	$6,041	$6,404	$6,788	$7,195	$7,626	$8,084	$8,569	$9,082	$9,627	$10,205
Total Calculated Revenues (User Charge Fees)		$183,600	$184,840	$641,973	$680,475	$721,287	$764,546	$810,400	$859,003	$910,522	$965,131	$1,023,014	$1,084,370
Operating Incomes													
User Charge Fees (first two years are estimated, next 10 years are calculated and assumed to be fully collectable)	N.A.	$197,000	$198,330	$641,973	$680,475	$721,287	$764,546	$810,400	$859,003	$910,522	$965,131	$1,023,014	$1,084,370
Late Payment Charge	N.A.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New Taps or Connections (Current Rate Structure)	% Above	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$2
Meter Size-based System Development Fees (Table 14)	% Above	$0	$3	$8,557	$9,070	$9,614	$10,191	$10,802	$11,450	$12,136	$12,864	$13,636	$14,454
Interest Income	N.A.	$0	$262	$134	$834	$2,113	$2,961	$3,629	$3,345	$3,293	$3,672	$4,432	$5,521
Increase in Non-payment (a Loss) Due to Rate (Bill) Increases Each Year, Estimated at 25 Percent of the Average Rate Increase Each Year	25.0%	$0	$0	-$112,773	-$9,535	-$10,107	-$10,713	-$11,356	-$12,037	-$12,758	-$13,524	-$14,335	-$15,194
Subsidy From the Business Council to NAU	N.A.	$528,942	$516,133	$500,000	$375,000	$250,000	$125,000	$0	$0	$0	$0	$0	$0
Income Increase From Stepped Up Billing and Collection From Existing Customers (Not Rate Increase Income, See Narrative Report)	N.A.	$0	$0	$32,099	$102,071	$180,322	$267,591	$283,640	$300,651	$318,683	$337,796	$358,055	$379,529
Total Operating Incomes		**$725,942**	**$714,728**	**$1,069,990**	**$1,157,916**	**$1,153,229**	**$1,159,576**	**$1,097,115**	**$1,162,413**	**$1,231,876**	**$1,305,938**	**$1,384,804**	**$1,468,681**

Table 4 - Operating Costs and Net Income

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table depicts expenses during the test year, this year and for the next 10 years. Some future costs will experience inflation. Those costs that go up as use goes up are increased by the cost inflation factor plus the growth rate in users.

(First year costs and net incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Ethete System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$336,442	$346,536	$356,932	$367,640	$378,669	$390,029	$401,730	$413,782	$426,195	$438,981	$452,151	$465,715
Arapahoe System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$363,260	$374,158	$385,383	$396,944	$408,853	$421,118	$433,752	$446,764	$460,167	$473,972	$488,192	$502,837
Additional Cost to Bring Utility to Full Staffing, Including Effects of Salary and Benefits Inflation	3.0%	$0	$0	$217,308	$225,038	$233,001	$241,202	$249,649	$258,350	$267,312	$276,543	$286,050	$295,843
One-time Reduction of R&R Annuity	0.0%	-$40,378	-$40,378	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Payment to R&R Reserve (Table 7)	0.0%	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378
User Charge Analysis Services	5.0%	$0	$6,862	$0	$0	$7,565	$0	$0	$8,341	$0	$0	$9,196	$0
Total CIP-related Payouts	N.A.	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5
Total Operating Costs		**$699,703**	**$727,556**	**$1,000,000**	**$1,030,000**	**$1,068,465**	**$1,092,727**	**$1,125,509**	**$1,167,615**	**$1,194,052**	**$1,229,874**	**$1,275,966**	**$1,304,773**
Net Income (or Loss)		$26,239	-$12,827	$69,990	$127,916	$84,764	$66,849	-$28,394	-$5,202	$37,824	$76,065	$108,838	$163,908
Working Capital Goal: 50%	In Dollars, That is:	$349,851	$363,778	$500,000	$515,000	$534,233	$546,364	$562,754	$583,807	$597,026	$614,937	$637,983	$652,387

Notes: Operating costs for each system came from the engineering reports written a decade ago, and have been increased to the present by a two percent annual inflation factor.

Table 5 - Capital Improvement Program (CIP)

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table depicts capital improvements and their funding. Costs reflect inflation.

	Test Year Starting	Analysis Year: 0 Year Starting	1st Year Starting	2nd Year Starting	3rd Year Starting	4th Year Starting	5th Year Starting	6th Year Starting	7th Year Starting	8th Year Starting	9th Year Starting	10th Year Starting
	1/1/18	1/1/19	1/1/20	1/1/21	1/1/22	1/1/23	1/1/24	1/1/25	1/1/26	1/1/27	1/1/28	1/1/29
Planned Spending, Debt-paid Portion of Projects (CIP costs to be funded with loans are shown in this section.)												
Combined Ethete and Arapahoe System Improvements. See notes below.	$0	$0	$0	$0	$150,000	$0	$0	$0	$0	$0	$0	$0
Total Debt-paid Portion of Projects	$0	$0	$0	$0	$150,000	$0	$0	$0	$0	$0	$0	$0
Planned Spending, Grant-paid Portion of Projects (CIP costs to be grant-funded are shown here.)												
Combined Ethete and Arapahoe System Improvements. See notes below.	$0	$0	$0	$0	$15,850,000	$0	$0	$0	$0	$0	$0	$0
Total Grant-paid Portion of Projects	$0	$0	$0	$0	$15,850,000	$0	$0	$0	$0	$0	$0	$0
Total CIP Costs	**$0**	**$0**	**$0**	**$0**	**$16,000,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Debt Repayment												
New Debt Payments (Following are payments for projects to be paid with new debt. It is assumed these will be loan/lease-financed for a term of: 40 years at a 2.5% interest rate.)												
USDA RD Loan at Poverty Interest Rate, Both Systems						$5,975	$5,975	$5,975	$5,975	$5,975	$5,975	$5,975
(This is the total cash required for this CIP and debt payment schedule. These amounts must come from utility income, reserves or outside sources, as shown in the next section.)												
CIP Fund Sources (Following are the sources and amounts of funds expected to pay for the above CIP schedule.)												
Cash Reserves (Internal Funds)												
Debt and CIP Reserves Starting Balance	$0	$0	$0	$0	$0	$0	-$5,975	-$12,070	-$18,287	-$24,628	-$31,096	-$37,694
Working Capital Transferred in	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$63,580
Debt and CIP Reserves Interest Earned (or Paid)	$0	$0	$0	$0	$0	$0	-$120	-$241	-$366	-$493	-$622	-$754
Total Available Internal Funds	$0	$0	$0	$0	$0	$0	-$6,095	-$12,312	-$18,653	-$25,121	-$31,718	$25,133
Grant and Loan Proceeds (External Funds)												
All Grant Proceeds	$0	$0	$0	$0	$15,850,000	$0	$0	$0	$0	$0	$0	$0
Loan Originated in 3rd Year					$150,000	$0	$0	$0	$0	$0	$0	$0
Total Available External Funds	$0	$0	$0	$0	$16,000,000	$0	$0	$0	$0	$0	$0	$0
Total Available Funds	**$0**	**$0**	**$0**	**$0**	**$16,000,000**	**$0**	**-$6,095**	**-$12,312**	**-$18,653**	**-$25,121**	**-$31,718**	**$25,133**
Outcomes (This CIP spending and funding plan will result in the following cash needs and ending balances each year.)												
Total Available Funds	**$0**	**$0**	**$0**	**$0**	**$16,000,000**	**$0**	**-$6,095**	**-$12,312**	**-$18,653**	**-$25,121**	**-$31,718**	**$25,133**
Total CIP-related Payouts	**$0**	**$0**	**$0**	**$0**	**$16,000,000**	**$5,975**	**$5,975**	**$5,975**	**$5,975**	**$5,975**	**$5,975**	**$5,975**
Debt and CIP Reserves Ending Balances	**$0**	**$0**	**$0**	**$0**	**$0**	**-$5,975**	**-$12,070**	**-$18,287**	**-$24,628**	**-$31,096**	**-$37,694**	**$19,157**

The source for cost and funding data above is David Myers, the utilities consulting engineer. Some projects have already been completed. Some have been bid but have not yet been completed. And some projects are yet to be bid. But funding for all projects is in place. Depicting all the variations would be confusing to readers, so here all work was assumed to be done in 2022 to simplify presentation.

Table 6 - Equipment Replacement Schedule - Detailed

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

Year Beginning	Annualized Costs Assumed at 5% of Operating Costs, Less Admin and Capital Costs									Total Annual Replacement Costs
1/1/19	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/20	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/21	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/22	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/23	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/24	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/25	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/26	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/27	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/28	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/29	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/30	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/31	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/32	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/33	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/34	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/35	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/36	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/37	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/38	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/39	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/40	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/41	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/42	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239
1/1/43	$26,239	$0	$0	$0	$0	$0	$0	$0	$0	$26,239

Table 7 - Equipment Replacement Annuity Calculation

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table calculates the annual annuity (savings deposit) needed to build replacement (R&R) reserves. This annuity amount should actually be deposited in a savings account. The annuity amount, called the "Required Annual Deposit (Annuity) to Replacement Account" below, should be included in the utility's general budget as a cost. As a result, all replacement and refurbishment scheduled in Table 6, the detailed replacement schedule, would be paid for out of R&R reserves and not out of the utility's general budget.

In simple terms, the annuity at the bottom of this table should be deposited into an account each year and R&R projects should be paid for out of that account.

3.00%	Average Inflation Rate for the Following Water System Equipment for the Term of This Replacement Schedule
2.00%	Average Interest Rate on Balances Invested for the Term of This Replacement Schedule
2.00%	Average Interest Rate on Amounts Borrowed for the Term of This Replacement Schedule

Year Beginning	Schedule Year	This Year's Costs in Current Dollars	Future Annual Inflated Net Costs	Interest Earned on Prior Balance	End of Year Balance in Future Dollars	Minimum Desired End of Year Balance in Future Dollars
1/1/19	Analysis Year	$26,239	$26,239	$0	-$26,239	$99,708
1/1/20	1st Year	$26,239	$27,026	-$525	-$13,412	$102,699
1/1/21	2nd Year	$26,239	$27,837	-$268	-$1,139	$105,780
1/1/22	3rd Year	$26,239	$28,672	-$23	$10,544	$108,953
1/1/23	4th Year	$26,239	$29,532	$211	$21,601	$112,222
1/1/24	5th Year	$26,239	$30,418	$432	$31,992	$115,588
1/1/25	6th Year	$26,239	$31,331	$640	$41,679	$119,056
1/1/26	7th Year	$26,239	$32,270	$834	$50,620	$122,628
1/1/27	8th Year	$26,239	$33,239	$1,012	$58,772	$126,307
1/1/28	9th Year	$26,239	$34,236	$1,175	$66,089	$130,096
1/1/29	10th Year	$26,239	$35,263	$1,322	$72,526	$133,999
1/1/30	11th Year	$26,239	$36,321	$1,451	$78,034	$138,019
1/1/31	12th Year	$26,239	$37,410	$1,561	$82,562	$142,159
1/1/32	13th Year	$26,239	$38,533	$1,651	$86,058	$146,424
1/1/33	14th Year	$26,239	$39,689	$1,721	$88,468	$150,817
1/1/34	15th Year	$26,239	$40,879	$1,769	$89,736	$155,341
1/1/35	16th Year	$26,239	$42,106	$1,795	$89,803	$160,002
1/1/36	17th Year	$26,239	$43,369	$1,796	$88,608	$164,802
1/1/37	18th Year	$26,239	$44,670	$1,772	$86,088	$169,746
1/1/38	19th Year	$26,239	$46,010	$1,722	$82,178	$174,838
				Starting Account Balance	$0	$99,708
				Minimum Annual Annuity	$36,780	Minimum Desired Balance in Today's Dollars
				Discretionary Annuity	$3,598	

Notes: There is currently no R&R schedule. Average R&R costs were instead estimated. A Discretionary Annuity amount was added so that at the end of the 20-year modeling period, the balance will equal the average of the annual replacement cost amounts, less interest paid for borrowing during the negative balance years.

Required Annual Deposit (Annuity) to Replacement Account **$40,378**

(This amount is included in Table 4 as an operating cost.)

Table 8 - Average Cost Classification

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table distributes costs from a representative year (the "average rate structure basis year) to fixed and variable categories (see Definitions) in order to calculate the "cost of service" rate structure for that year.

The average rate structure basis year runs from: 1/1/2023 through 12/31/2023

Cost Items	Cost During Rate Structure Basis Year	Fixed Cost %	Variable Cost %	Fixed Cost	Variable Cost
Ethete System Operating Costs, 2008 + 2% Annual Inflation to 2018	$390,029	33.3%	66.7%	$129,997	$260,032
Arapahoe System Operating Costs, 2008 + 2% Annual Inflation to 2018	$421,118	33.3%	66.7%	$140,359	$280,760
Additional Cost to Bring Utility to Full Staffing, Including Effects of Salary and Benefits Inflation	$241,202	33.3%	66.7%	$80,393	$160,809
Annual Payment to R&R Reserve (Table 7)	$40,378	33.0%	67.0%	$13,325	$27,053
User Charge Analysis Services	$0	33.0%	67.0%	$0	$0
Total CIP-related Payouts, Less Capacity Charges From Tables 14 & 16 (This value can be negative)	$5,126	50.0%	50.0%	$2,563	$2,563
Grand Total Costs, Weighted Avg Percentages	$1,097,853	33.4%	66.6%	$366,636	$731,217

Bases for Cost to Serve Rate Structure

		100%	$1,097,853
Number Customers During Year Defined Above	936	Unbilled-for Water is Estimated at	0%
Billed Volume, in Gallons, During Year Defined Above	79,299,913	Unbilled-for Water is Estimated at This Percentage of Average Cost	96%
Average Fixed Cost per User per Month During Year Defined Above	$32.65	Resulting Cost of Unbilled-for Water	$0
Average Variable Cost to Produce per 1,000 Gallons During Year Defined Above	$9.22	Test Year Customer Metered Volume, in Gallons	76,272,000
Gallons per Billing Cycle Used by Average Residential Customer	7,000	+ Test Year Unbilled-for Water, in Gallons	0
		Total Test Year Volume, in Gallons, From Master Meter Readings	76,272,000

Note: Unbilled-for water was not included in this calculation, so those values appear as zeros.

Table 10 - Initial Rate Adjustments and Resulting Revenues

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table calculates a new set of user charge rates and the revenues they would generate.

12/31/19 Date when fees will first be collected at adjusted rates. Actual adjustment should occur one billing cycle earlier.

After rate adjustments are made, customers will be billed monthly.

Blended Sales Revenues: Sales at the current (Test Year) rates (gray highlighted column) will apply until rates are adjusted. Sales at the modeled rates (yellow highlighted column) would apply after the modeled rates are adopted. The "blended" sales revenues show in the right-most column.

Customer Class, Rate Class or Meter Size	Volume Range Bottom (in Gallons)	Volume Range Top (in Gallons)	Sales This Year at Current Rates	Flat Fee, Residential Customers Only	Minimum Charge for Calculation Purposes	New Usage Allowance in 1,000 Gallons	New Unit Charge per 1,000 Gallons	Sales This Year at Modeled Rates	Total "Blended" Sales This Year
Ethete Enrolled Tribe Member Residential	0	9,999,999	$77,918	$58.55				$737	$78,655
Ethete Senior Enrolled Tribe Member Residential	0	9,999,999	$0	$58.55				$0	$0
Ethete Non-enrolled Tribe Member Residential	0	9,999,999	$0	$58.55				$0	$0
Ethete Non-enrolled Tribe Member Senior Residential	0	9,999,999	$0	$58.55				$0	$0
Ethete Enrolled Tribe Member Commercial	0	9,999,999	$4,883		$21.66	0.000	$5.27	$52	$4,934
Ethete Non-enrolled Tribe Member Commercial	0	9,999,999	$0		$21.66	0.000	$5.27	$0	$0
Arapahoe Enrolled Tribe Member Residential	0	9,999,999	$96,635	$58.55				$914	$97,549
Arapahoe Senior Enrolled Tribe Member Residential	0	9,999,999	$0	$58.55				$0	$0

Table 10 - Initial Rate Adjustments and Resulting Revenues

Customer Class, Rate Class or Meter Size	Volume Range Bottom (in Gallons)	Volume Range Top (in Gallons)	Sales This Year at Current Rates	Flat Fee, Residential Customers Only	Minimum Charge for Calculation Purposes	New Usage Allowance in 1,000 Gallons	New Unit Charge per 1,000 Gallons	Sales This Year at Modeled Rates	Total "Blended" Sales This Year
Arapahoe Non-enrolled Tribe Member Residential	0	9,999,999	$0	$58.55				$0	$0
Arapahoe Senior Non-enrolled Tribe Member Residential	0	9,999,999	$0	$58.55				$0	$0
Arapahoe Enrolled Tribe Member Commercial	0	9,999,999	$3,662		$21.66	0.000	$5.27	$39	$3,701
Arapahoe Non-enrolled Tribe Member Commercial	0	9,999,999	$0		$21.66	0.000	$5.27	$0	$0
Total Rate Revenue at Current Rates			$183,097				Total Rate Revenue at Modeled Rates	$1,742	
							Total Blended Rate Revenues for the Year		$184,839

12.0 months at the old user charge rates and 0.0 months at the new user charge rates.

Table 11 - Capacity Costs

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

System capacity and connection costs WILL be recovered in one way by default, or a combination of ways by design. That could be through regular user fees, in which case existing customers pay the costs to bring on new customers. It could be through system development or connection fees, in which case new customers pay "up front" for the capacity they are granted. It could be through on-going capacity surcharges added to minimum charges, preferably based on meter or connection size, in which case each customer pays for the capacity they are granted over time. Or, it could be by a combination of these. This table shows capacity costs to expect. From these costs, system development fees and surcharges were developed in Tables 13 through 16.

Peak and Base Flow Capacity Costs

	Fixed Assets Original Value, Net of Grants (Capacity Cost)	% of Value Attributable to Peak Flow Capacity	Peak Flow Capacity Cost	Annual Peak Flow Capacity Cost (40-year Depreciation)	% of Value Attributable to Base Flow Capacity	Base Flow Capacity Cost	Annual Base Flow Capacity Cost (40-year Depreciation)
	$4,500,000	50.0%	$2,250,000	$131,126	50.0%	$2,250,000	$131,126
Totals	$4,500,000		$2,250,000	$131,126		$2,250,000	$131,126

How Capacity Costs Will Be Recovered

These costs are modeled to be recovered from system development fees in Table 14

Peak Flow Capacity Costs to be Recovered by System Development Fees	
0.6480%	Target Percentage of Costs to Recover
$850	Target Portion of Costs to Recover
$850	Cost per Peak Flow Capacity Share

Base Flow Capacity Costs to be Recovered by System Development Fees	
0.0%	Target Percentage of Costs to Recover
$0	Target Portion of Costs to Recover
$0	Base Capacity Cost per New Customer Connected

In addition to calculation of the capacity cost for each new connection based on the unit cost above, the system development fee for each new connection should also include recovery of the following costs:

$100	Average Field Cost per New Connection
$50	Average Administration Cost per New Connection
$150	Field and Admin Cost per New Connection
$150	Base Cost to Recover per New Connection

These costs are modeled to be recovered from minimum charge surcharges in Table 16

Peak Flow Capacity Costs to be Recovered by Minimum Charge Surcharges	
25.0%	Target Percentage of Costs to Recover
$32,781	Target Portion of Costs to Recover in One Full Year
$2,732	Target Portion of Costs to Recover in Monthly Surcharges
$3.00	Monthly Surcharge per Peak Flow Capacity Share

Base Flow Capacity Costs to be Recovered by Minimum Charge Surcharges	
0.0%	Target Percentage of Costs to Recover
$0	Target Portion of Costs to Recover in One Full Year
$0	Target Portion of Costs to Recover in Monthly Surcharges
$0.00	Monthly Base Flow Surcharge per Bill

Note: Non-capital costs, such as field costs for inspection of connections and administration costs, should be recovered by fees charged for providing the services involved. These costs are in addition to peak flow capacity costs. If your system's basic costs to sign up and connect new customers is different than assumed above, adjust your final fees accordingly.

Table 12 - AWWA Safe Operating Capacities by Meter Size

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

Data source: Table VII.2-5, page 338, AWWA Manual M1 Principles of Water Rates, Fees and Charges, Seventh Edition

This table calculates the meter equivalent ratio, which is used for calculating peak flow capacity-based system development fees, surcharges and revenues in Tables 13 through 16.

Meter Size, in Inches	Meter Type	Maximum-Rated Safe Operating Flow, in gallons per minute	Meter Equivalent Ratio (Capacity Shares)
Five Eighths	Displacement	20	1.0
Three Quarters	Displacement	30	1.5
One Inch	Displacement	50	2.5
One & a Half Inch	Displacement	100	5.0
Two Inch	Displacement	160	8.0
Three	Singlet	320	16.0
Three	Compound, Class I	320	16.0
Three	Turbine, Class I	350	17.5
Four	Singlet	500	25.0
Four	Compound, Class I	500	25.0
Four	Turbine, Class I	630	31.0
Six	Singlet	1,000	50.0
Six	Compound, Class I	1,000	50.0
Six	Turbine, Class I	1,300	65.0
Eight	Compound, Class I	1,600	80.0
Eight	Turbine, Class I	2,800	140.0
Ten	Turbine, Class II	4,200	210.0
Twelve	Turbine, Class II	5,300	265.0

Table 13 - System Development Fees

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table calculates system development fees to charge each meter size.

Note: Larger meter sizes are available in two or more types, each having different flow capacities. To be conservative when projecting revenues, it was assumed all meters in use are of the lowest capacity types. However, when setting fees, they should be based upon the type of meter in use at each location.

Connection Fees

Meter Size	Meter Type	AWWA Capacity "Share" Factor, Compared to 5/8 Inch Meter	Foot Notes	Adjusted Peak Capacity Cost Each Meter Size	Base Capacity Cost From Table 11	Uniform Adj to Base Capacity Cost	Adjusted Base Capacity Cost	Peak Plus Base Capacity Cost	Field and Admin Cost per New Connection	System Development Fee
Five Eighths	Displacement	1.0		$850	$0	$0	$0	$850	$150	$1,000
Three Quarters	Displacement	1.0	1	$850	$0	$0	$0	$850	$150	$1,000
One Inch	Displacement	2.5		$2,124	$0	$0	$0	$2,124	$150	$2,274
One & a Half Inch	Displacement	5.0		$4,248	$0	$0	$0	$4,248	$150	$4,398
Two Inch	Displacement	8.0		$6,798	$0	$0	$0	$6,798	$150	$6,948
Two & a Half Inch	Displacement	12.5	2	$10,621	$0	$0	$0	$10,621	$150	$10,771
Three Inch	Singlet	16.0		$13,595	$0	$0	$0	$13,595	$150	$13,745
Three Inch	Compound, Class I	16.0		$13,595	$0	$0	$0	$13,595	$150	$13,745
Three Inch	Turbine, Class I	17.5		$14,870	$0	$0	$0	$14,870	$150	$15,020
Four Inch	Singlet	25.0		$21,242	$0	$0	$0	$21,242	$150	$21,392
Four Inch	Compound, Class I	25.0		$21,242	$0	$0	$0	$21,242	$150	$21,392
Four Inch	Turbine, Class I	31.0		$26,341	$0	$0	$0	$26,341	$150	$26,491
Six Inch	Singlet	50.0		$42,485	$0	$0	$0	$42,485	$150	$42,635
Six Inch	Compound, Class I	50.0		$42,485	$0	$0	$0	$42,485	$150	$42,635
Six Inch	Turbine, Class I	65.0		$55,230	$0	$0	$0	$55,230	$150	$55,380
Eight Inch	Compound, Class I	80.0		$67,976	$0	$0	$0	$67,976	$150	$68,126
Eight Inch	Turbine, Class I	140.0		$118,957	$0	$0	$0	$118,957	$150	$119,107

Foot Notes, which apply to Tables 14, 15 and 16, as well:

[1] The Three-Quarter-Inch meter capacity share factor is 1.5. However, it was set equal to the Five-eighths-Inch meter because most such meters are used for residential connections. This enables a uniform system development fee for almost all residential customers.

[2] These meter sizes were not included in AWWA study results, so these values are estimates.

Table 14 - Revenues From System Development Fees

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table calculates total fee revenues that would be generated during one full year at the fees in Table 13.

Connection Fees

Meter Size	Meter Type	Mix of New Taps in a Typical Year	Capacity Shares After Economy of Scale Adj	Adjusted Annual Growth in Capacity Shares	Adjusted Peak Capacity Fees, One Full Year	Base Capacity Fees, One Full Year	Combined Capacity Fees, One Full Year	Adjusted Admin and Field Fees, One Full Year	**System Development Fee Revenues, One Full Year**
Five Eighths	Displacement	0.0	1.0	0.0	$0	$0	$0	$0	**$0**
Three Quarters	Displacement	1.0	1.0	1.0	$850	$0	$850	$150	**$1,000**
One Inch	Displacement	0.0	2.5	0.0	$0	$0	$0	$0	**$0**
One & a Half Inch	Displacement	0.0	5.0	0.0	$0	$0	$0	$0	**$0**
Two Inch	Displacement	0.0	8.0	0.0	$0	$0	$0	$0	**$0**
Two & a Half Inch	Displacement	0.0	12.5	0.0	$0	$0	$0	$0	**$0**
Three Inch	Singlet	0.0	16.0	0.0	$0	$0	$0	$0	**$0**
Three Inch	Compound, Class I	0.0	16.0	0.0	$0	$0	$0	$0	**$0**
Three Inch	Turbine, Class I	0.0	17.5	0.0	$0	$0	$0	$0	**$0**
Four Inch	Singlet	0.0	25.0	0.0	$0	$0	$0	$0	**$0**
Four Inch	Compound, Class I	0.0	25.0	0.0	$0	$0	$0	$0	**$0**
Four Inch	Turbine, Class I	0.0	31.0	0.0	$0	$0	$0	$0	**$0**
Six Inch	Singlet	0.0	50.0	0.0	$0	$0	$0	$0	**$0**
Six Inch	Compound, Class I	0.0	50.0	0.0	$0	$0	$0	$0	**$0**
Six Inch	Turbine, Class I	0.0	65.0	0.0	$0	$0	$0	$0	**$0**
Eight Inch	Compound, Class I	0.0	80.0	0.0	$0	$0	$0	$0	**$0**
Eight Inch	Turbine, Class I	0.0	140.0	0.0	$0	$0	$0	$0	**$0**
	Total:	1.0		1.0	$850	$0	$850	$150	**$1,000**

This is the amount used to calculate the "Meter Size-based System Development Fees" income in Table 3.

Table 15 - Minimum Charge Fees, Including Capacity Surcharges

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table does, essentially, the same thing as Table 13, except costs are recovered over time as minimum charge surcharges.

Rates Applied to Commercial Customers

Meter Size	Meter Type	Monthly Peak Capacity-only Cost per Capacity Share	Uniform Adj to Peak Capacity Cost	Peak Plus Base Capacity Cost	Adjusted Peak Capacity-only Surcharge Revenues	Monthly Base Capacity-only Cost per Customer	Uniform Adj to Base Capacity Cost	Adjusted Monthly Base Capacity Cost	Base Capacity-only Surcharge Revenues	Cost to Serve Minimum From Table 10	Monthly Minimum Charge
Five Eighths	Displacement	$3.00	$0.00	$3.00	$0	$0.00	$0.00	$0.00	$0	$18.66	$21.66
Three Quarters	Displacement	$3.00	$0.00	$3.00	$32,781	$0.00	$0.00	$0.00	$0	$18.66	$21.66
One Inch	Displacement	$7.51	$0.00	$7.51	$0	$0.00	$0.00	$0.00	$0	$18.66	$26.17
One & a Half Inch	Displacement	$15.02	$0.00	$15.02	$0	$0.00	$0.00	$0.00	$0	$18.66	$33.68
Two Inch	Displacement	$24.03	$0.00	$24.03	$0	$0.00	$0.00	$0.00	$0	$18.66	$42.69
Two & a Half Inch	Displacement	$37.54	$0.00	$37.54	$0	$0.00	$0.00	$0.00	$0	$18.66	$56.20
Three Inch	Singlet	$48.05	$0.00	$48.05	$0	$0.00	$0.00	$0.00	$0	$18.66	$66.72
Three Inch	Compound, Class I	$48.05	$0.00	$48.05	$0	$0.00	$0.00	$0.00	$0	$18.66	$66.72
Three Inch	Turbine, Class I	$52.56	$0.00	$52.56	$0	$0.00	$0.00	$0.00	$0	$18.66	$71.22
Four Inch	Singlet	$75.09	$0.00	$75.09	$0	$0.00	$0.00	$0.00	$0	$18.66	$93.75
Four Inch	Compound, Class I	$75.09	$0.00	$75.09	$0	$0.00	$0.00	$0.00	$0	$18.66	$93.75
Four Inch	Turbine, Class I	$93.11	$0.00	$93.11	$0	$0.00	$0.00	$0.00	$0	$18.66	$111.77
Six Inch	Singlet	$150.17	$0.00	$150.17	$0	$0.00	$0.00	$0.00	$0	$18.66	$168.83
Six Inch	Compound, Class I	$150.17	$0.00	$150.17	$0	$0.00	$0.00	$0.00	$0	$18.66	$168.83
Six Inch	Turbine, Class I	$195.22	$0.00	$195.22	$0	$0.00	$0.00	$0.00	$0	$18.66	$213.88
Eight Inch	Compound, Class I	$240.27	$0.00	$240.27	$0	$0.00	$0.00	$0.00	$0	$18.66	$258.93
Eight Inch	Turbine, Class I	$420.48	$0.00	$420.48	$0	$0.00	$0.00	$0.00	$0	$18.66	$439.14

Table 16 - Revenues From Minimum Charges

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table calculates total minimum charge surcharge revenues that would be generated during one full year at the fees in Table 15.

Meter Size	Meter Type	Capacity Shares After Economy of Scale Adj	Current Number Meters This Size	Total Adjusted Capacity Shares	Adjusted Peak Capacity-only Surcharge Revenues	Base Capacity-only Surcharge Revenues	Capacity Surcharges for One Full Year
Rates Applied to Commercial Customers							
Five Eighths	Displacement	1.0	0	0	$0	$0	$0
Three Quarters	Displacement	1.0	910	910	$32,781	$0	$32,781
One Inch	Displacement	2.5	0	0	$0	$0	$0
One & a Half Inch	Displacement	5.0	0	0	$0	$0	$0
Two Inch	Displacement	8.0	0	0	$0	$0	$0
Two & a Half Inch	Displacement	12.5	0	0	$0	$0	$0
Three Inch	Singlet	16.0	0	0	$0	$0	$0
Three Inch	Compound, Class I	16.0	0	0	$0	$0	$0
Three Inch	Turbine, Class I	17.5	0	0	$0	$0	$0
Four Inch	Singlet	25.0	0	0	$0	$0	$0
Four Inch	Compound, Class I	25.0	0	0	$0	$0	$0
Four Inch	Turbine, Class I	31.0	0	0	$0	$0	$0
Six Inch	Singlet	50.0	0	0	$0	$0	$0
Six Inch	Compound, Class I	50.0	0	0	$0	$0	$0
Six Inch	Turbine, Class I	65.0	0	0	$0	$0	$0
Eight Inch	Compound, Class I	80.0	0	0	$0	$0	$0
Eight Inch	Turbine, Class I	140.0	0	0	$0	$0	$0
Ten Inch	Turbine, Class II	210.0	0	0	$0	$0	$0
		Total:	910	910	$32,781	$0	$32,781

Table 17 - Financial Capacity Indicators and Reserves

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

This table depicts the affordability of future rates, the financial health of the system and the ending balances in various (assumed) accounts for the test year and the next 10 years.

Capacity Indicators	Test Year Starting 1/1/18	0 Year Starting 1/1/19	1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Customary Affordability Index: Monthly Bill for a 5,000 gal per Month Residential Customer	$20.00	$58.55	$58.55	$61.48	$64.56	$67.78	$71.17	$74.73	$78.47	$82.39	$86.51	$90.84
AMHI Within Service Area	$49,453	$50,327	$51,217	$52,122	$53,043	$53,981	$54,935	$55,906	$56,894	$57,900	$58,923	$59,964
Affordability Index: Current Rates First Column, Modeled Rates After That	0.49%	1.40%	1.37%	1.42%	1.46%	1.51%	1.55%	1.60%	1.66%	1.71%	1.76%	1.82%
Affordability Index (AI) goes to the willingness and ability of customers to pay. AI is the cost of 60,000 gallons of residential service per year (5,000 gallons per month) divided by the Annual Median Household Income (AMHI) in the service area (gleaned from Census data or a survey). Rates near 1.0% are common in the U.S. and are generally considered affordable. Most grant agencies will not consider awarding grants if this indicator is less than 1.5 to 2.0%.												
Low-income, Low-volume Affordability Index: Monthly Bill for a 2,000 gal per Month Residential Customer	$20.00	$58.55	$58.55	$61.48	$64.56	$67.78	$71.17	$74.73	$78.47	$82.39	$86.51	$90.84
Income at One-half the AMHI and Rising at One-half the Rate Above	$24,726	$24,945	$25,165	$25,388	$25,612	$25,839	$26,067	$26,297	$26,530	$26,764	$27,001	$27,239
Affordability for Low-income, Low-volume: Current Rates First Column, Modeled Rates After That	0.97%	2.82%	2.79%	2.91%	3.02%	3.15%	3.28%	3.41%	3.55%	3.69%	3.84%	4.00%
This additional indicator of affordability assumes a residential customer with income at one-half of the median household income above, that income is growing at one-half the rate of the median household income and the customer uses 2,000 gallons per month. Such a customer is likely either a minimum wage or near-minimum wage worker, or is retired and living only on Social Security benefits. Such customers are more commonly the "slow pays" and "no pays" compared to others.												
Estimated Operating Ratio: Current Rates First Column, Modeled Rates After That	1.04	0.98	1.07	1.12	1.08	1.06	0.97	1.00	1.03	1.06	1.09	1.13
Operating ratio (OR) is a measure of the utility's ability to pay its operating expenses using only current incomes. A 1.0 OR is break even. Below 1.0 indicates operating in the "red." Generally, the OR should be at least 1.15 for large systems, 1.30 or more for medium-sized systems and perhaps as high as 2.0 for small systems. Note: If the utility has or will have reserves (below,) it has more ability to pay its operating costs than the OR implies.												
Estimated Coverage Ratio: Current Rates First Column, Modeled Rates After That	N.A.	N.A.	N.A.	N.A.	N.A.	0.00	0.00	0.00	0.00	0.00	0.00	10.64
Coverage Ratio (CR) goes to the ability of the utility to pay its debt payments out of current incomes. OR applies only to years with debt service. 1.0 is break even. Generally, the CR should be at least 1.25. Note: If the utility has or will have reserves (shown below,) it has more ability to make debt payments than the CR implies.												

Reserves	Balance Ending on 12/31/18	Balance Ending on 12/31/19	Balance Ending on 12/31/20	Balance Ending on 12/31/21	Balance Ending on 12/31/22	Balance Ending on 12/31/23	Balance Ending on 12/31/24	Balance Ending on 12/31/25	Balance Ending on 12/31/26	Balance Ending on 12/31/27	Balance Ending on 12/31/28	Balance Ending on 12/31/29
Cash and Cash Equivalents	$26,239	$13,412	$83,401	$211,317	$296,080	$362,929	$334,535	$329,333	$367,157	$443,222	$552,059	$652,387
Other Liquid Assets	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Undedicated Cash Assets	$26,239	$13,412	$83,401	$211,317	$296,080	$362,929	$334,535	$329,333	$367,157	$443,222	$552,059	$652,387
Total Cash Assets Discounted for Inflation (Future Unrestricted Purchasing Power)	$26,239	$13,412	$80,899	$198,828	$270,225	$321,298	$287,277	$274,325	$296,657	$347,372	$419,693	$495,965
Repair & Replacement	-$26,239	-$13,412	-$1,139	$10,544	$21,601	$31,992	$41,679	$50,620	$58,772	$66,089	$72,526	$78,034
Debt and CIP Reserves	$0	$0	$0	$0	$0	-$5,975	-$12,070	-$18,287	-$24,628	-$31,096	-$37,694	$19,157
Sum of All Reserves	$0	$0	$82,262	$221,861	$317,681	$388,946	$364,144	$361,666	$401,300	$478,214	$586,892	$749,577

Table 18 - Bills Before and After Rate Adjustments

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-7, Full Staffing, Stop Subsidies

Overall effective rate increase	189.3%

The revenue increase above includes meter size-based minimum charges calculated in Table 15, to be assessed to commercial customers only.

This table shows residential customer flat rates, which accounts for nearly all customers.

Customer, Rate Class or Meter Size	Current Bill	Modeled Bill	Modeled Bill Increase or Decrease (-)
Residential Customer	$20.00	$58.55	$38.55

Table 18B - Comparison of Residential Bills From the Four Models

This table compares bills for residential customers calculated by the Full Staffing, Stop Subsidies Model with rates from the other three models. The other three models depict different combinations of keeping staffing unsustainably low and having the Business Council subsidize the utility to keep rates artificially low.

Monthly Bill for Full Staffing, Stop Subsidies Model	Model Being Compared	Monthly Bill From This Model	This Bill is Cheaper by:	This Bill is Cheaper by:
$58.55	Low Staffing, Stop Subsidies	$44.55	$14.01	24%
$58.55	Full Staffing, Keep Subsidies	$31.36	$27.20	46%
$58.55	Low Staffing, Keep Subsidies	$17.34	$41.21	70%

Chart 1 - Operating Ratio

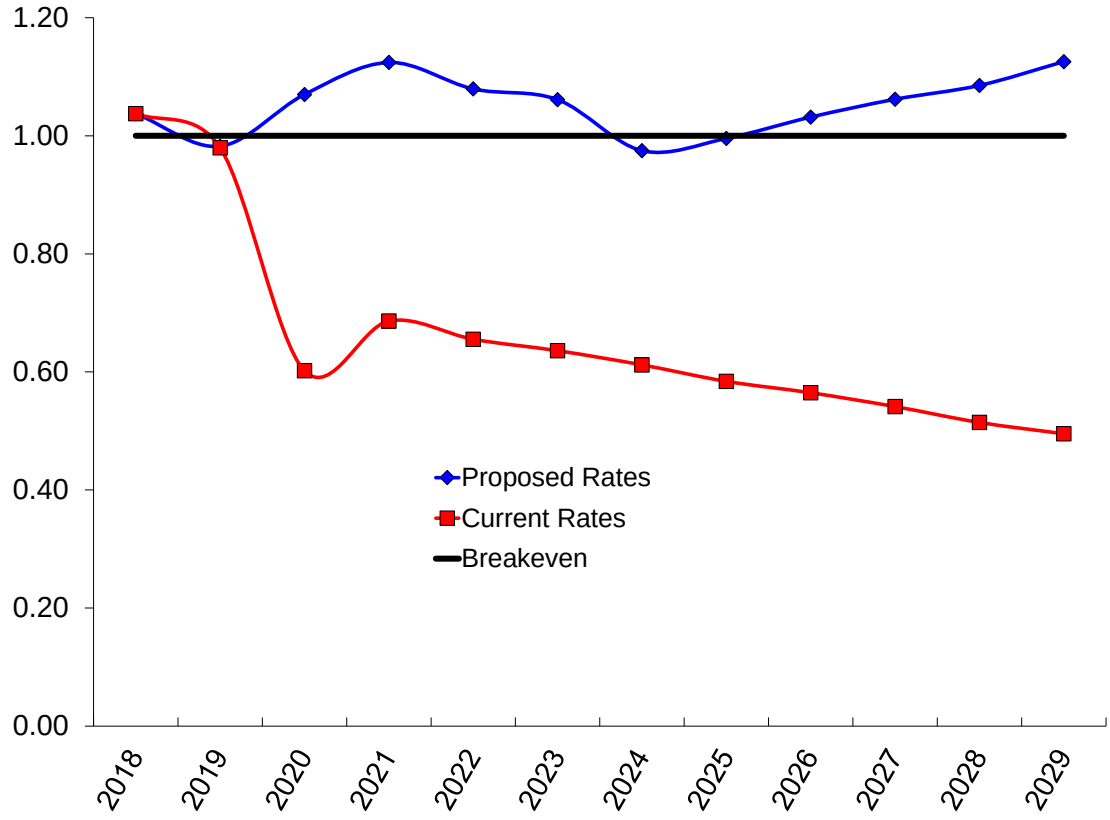


Chart 2 - Coverage Ratio

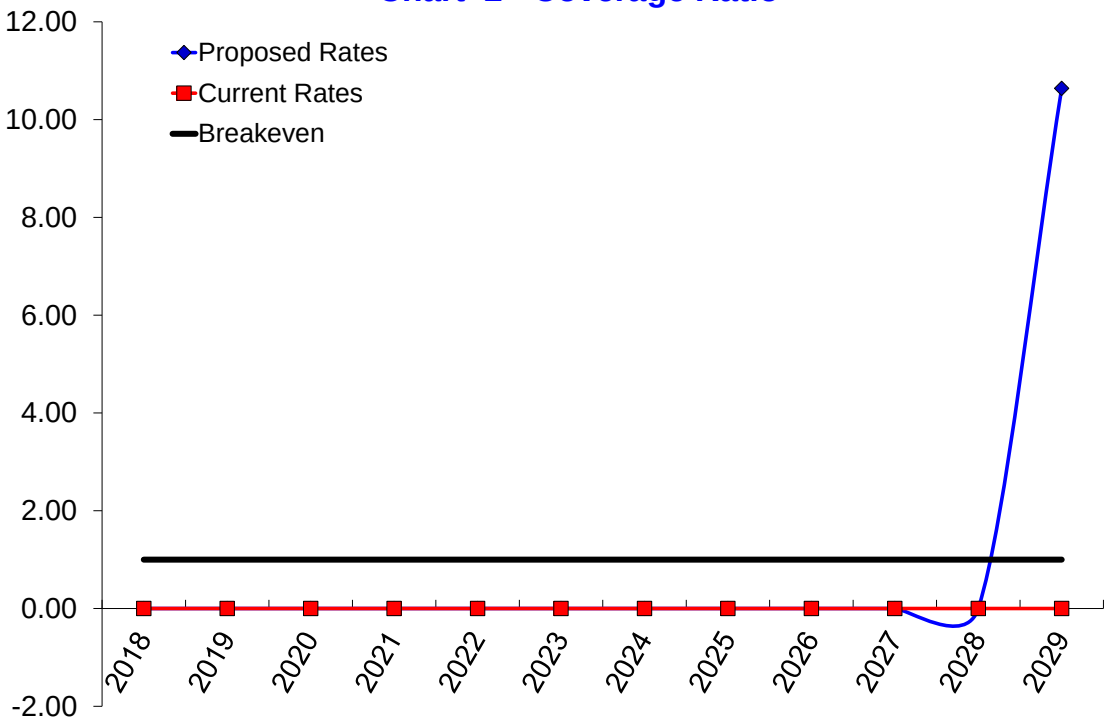


Chart 3 - Residential Users' Bills

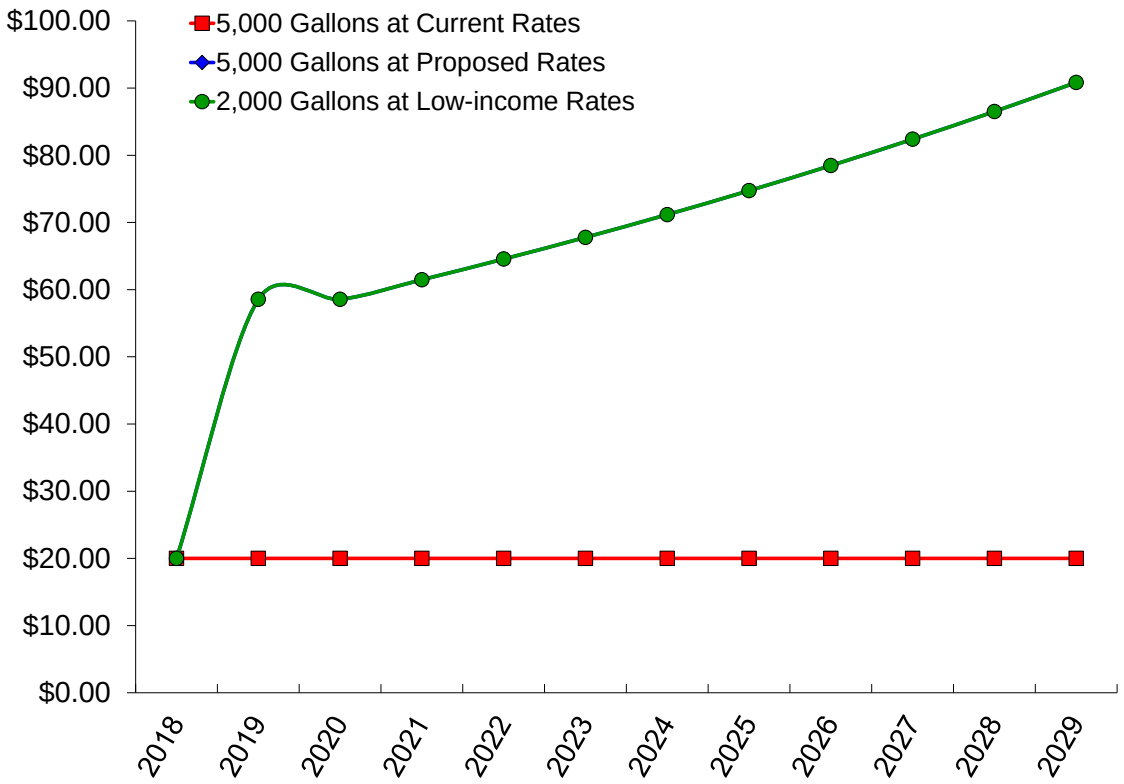


Chart 4 - Affordability

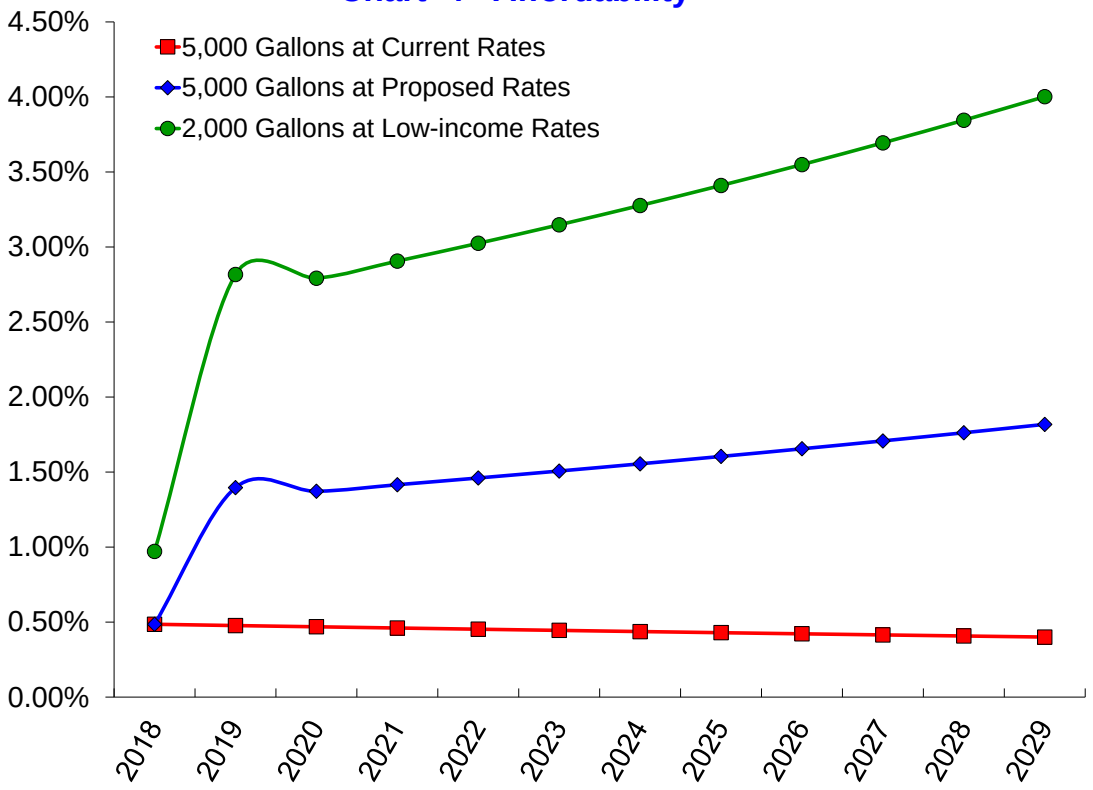


Chart 5 - Working Capital vs Goal

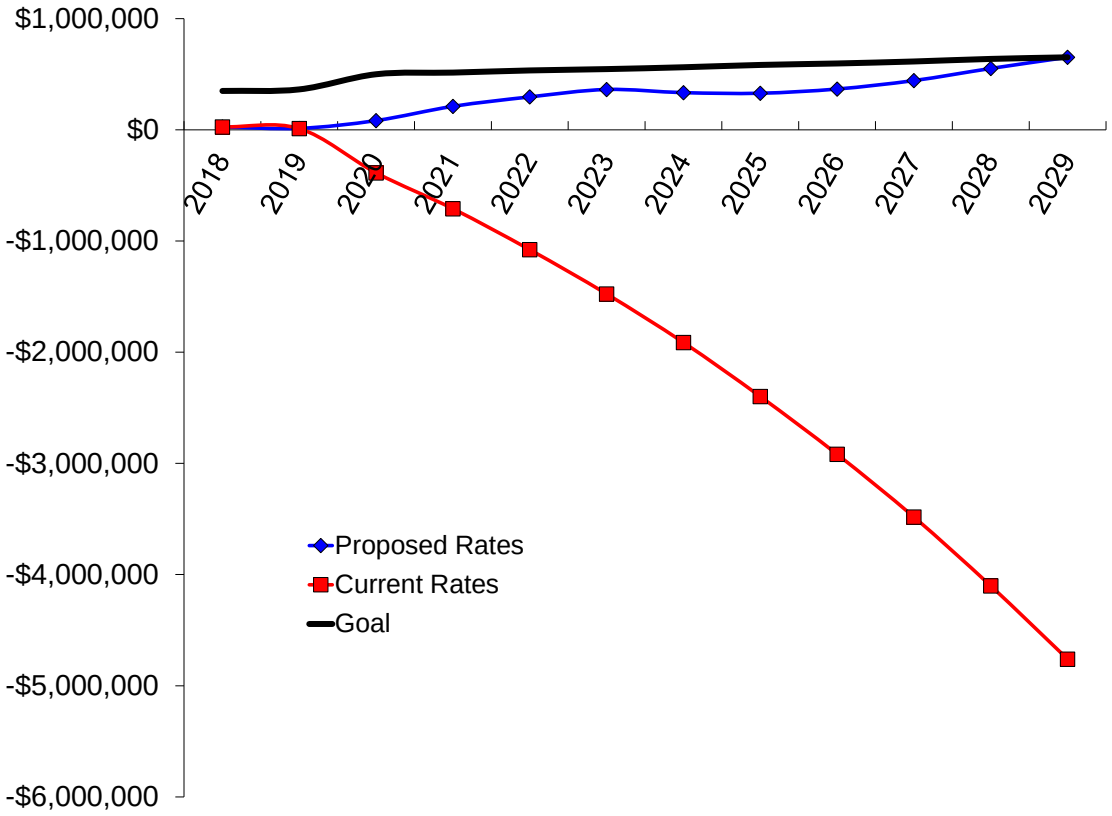


Chart 6 - Value of Cash Assets Before Inflation

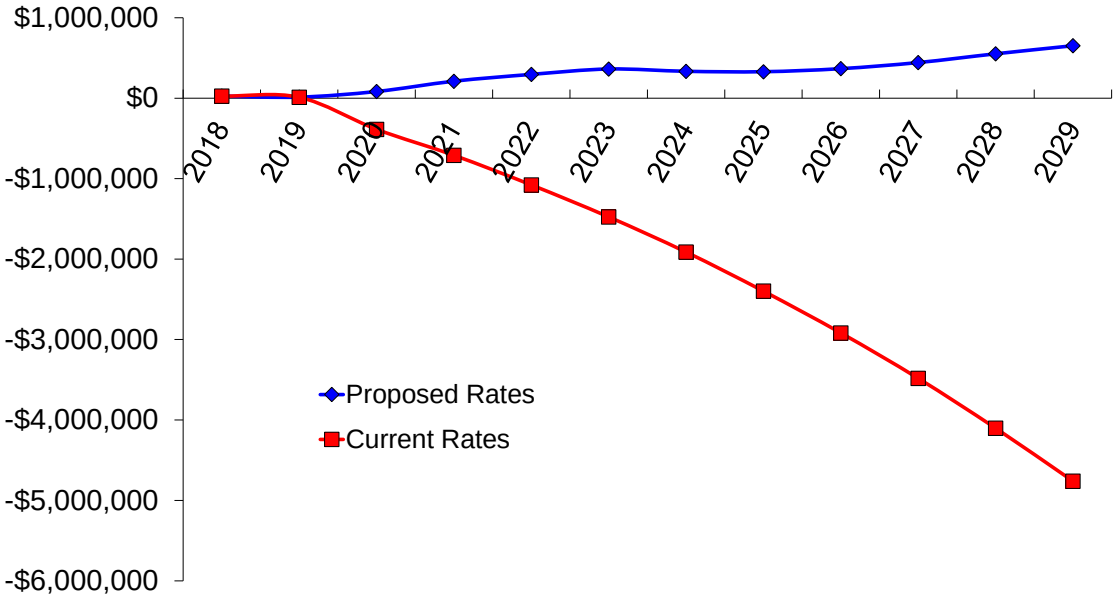


Chart 7 - Value of Cash Assets After Inflation

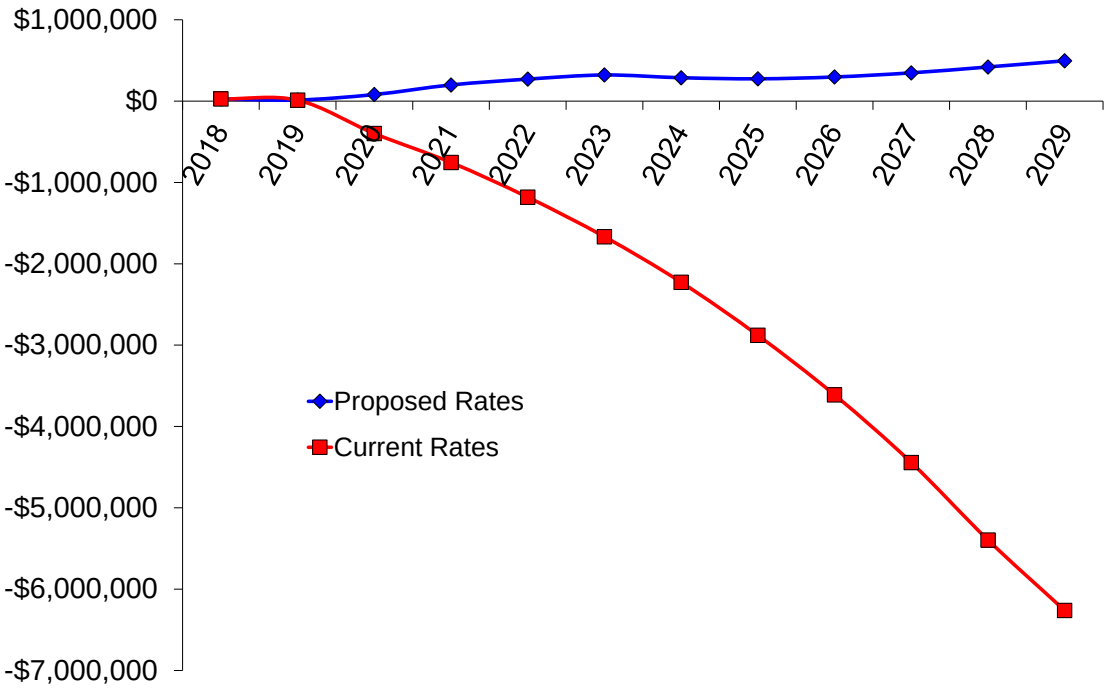
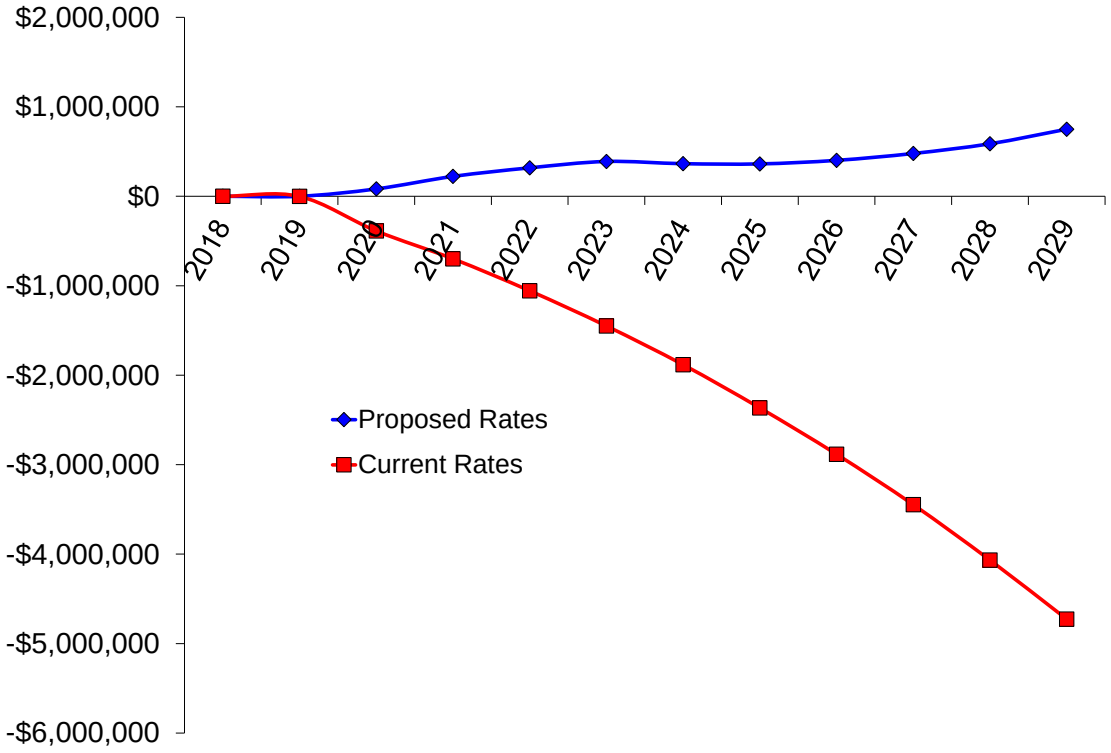


Chart 8 - Sum of All Reserves



Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-8, Low Staffing, Stop Subsidies

This model assumes staffing of the utility will be kept too low, and subsidies from the Business Council will cease by 2024.

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Note: This document is a print out of the spreadsheet model used to calculate new user charge and other rates and fees for the next 10 years. These calculations are complex and are based upon many conditions and assumtions. These issues, and others, are described in a narrative report that accompanies this model.

Table 3 - Operating Incomes and Basic User Data

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-8, Low Staffing, Stop Subsidies

This table depicts user statistics, customer growth, and system incomes and across the board "inflationary" style rate increases through the 10th year.

Annual Median Household Income (AMHI)

$48,594	Census Bureau estimate of AMHI for the year	2017
$47,750	Census Bureau estimate of AMHI for the year	2016
$844	AMHI growth during this time period	
1.77%	Simple annual income growth rate during this time period (used to project incomes into the future)	

Test Year Growth of Customer Base and Average Tap Fee Paid per Connection

1 Number of new connections made during the test year

$0 Average tap or installation fee assessed during the test year

This model is programmed for rates to be reset in the "Analysis Year," also called the "0 Year" column below (heading highlighted blue). Revenues will be collected at the now-current rates for the first part of the analysis year and the modeled rates for the last part of the analysis year. Thus, the revenues shown in the last column of that table are "blended" revenues; part collected at the old rates and part collected at the new rates. It was then assumed that all rate adjustments made after the initial (major) adjustment will be done annually on approximately the anniversary of the first adjustment. If rates will not be adjusted during the "0 Year," an adjustment (normally a revenue reduction) was calculated below to account for the late start in making the first adjustments.

Basic User (Customer) Data

(First year balances and incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Across-the-Board Rate Increases Projected for Years After the Initial Adjustment Year (1st Year)	N.A.	N.A.	N.A.	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
				The row above shows the rate at which user charge fees should be increased for each year beyond the initial rate adjustment year. Unless stated otherwise, these should be across-the-board increases to all rates and fees and that should continue until a new rate analysis is done.									
Average Number of Customers for the Year	N.A.	900	901	910	918	927	936	945	954	963	972	981	990
Customers Added or Lost (-) During the Year	N.A.	1.0	1.0	8.6	8.6	8.7	8.8	8.9	9.0	9.1	9.1	9.2	9.3
Customer Growth Rate (from Engineering Reports)	N.A.	0.11%	0.11%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%
Actual (Test Year) and Projected Volumes, in Gallons	N.A.	76,272,000	76,356,747	77,082,136	77,814,416	78,553,653	79,299,913	80,053,262	80,813,768	81,581,499	82,356,523	83,138,910	83,928,730
How User Charge Fees Were Calculated, Accounting for New Customers and Future Rate Increases													
Actual or Calculated Sales Revenues		$183,600	$184,422	$483,752	$512,765	$543,518	$576,115	$610,668	$647,293	$686,114	$727,264	$770,881	$817,115
Additional Sales Revenues From New Customers			$1	$4,596	$4,871	$5,163	$5,473	$5,801	$6,149	$6,518	$6,909	$7,323	$7,763
Total Calculated Revenues (User Charge Fees)		$183,600	$184,423	$488,347	$517,636	$548,681	$581,588	$616,469	$653,442	$692,632	$734,173	$778,205	$824,878
Operating Incomes													
User Charge Fees (first two years are estimated, next 10 years are calculated and assumed to be fully collectable)	N.A.	$197,000	$197,883	$488,347	$517,636	$548,681	$581,588	$616,469	$653,442	$692,632	$734,173	$778,205	$824,878
Late Payment Charge	N.A.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New Taps or Connections (Current Rate Structure)	% Above	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$2
Meter Size-based System Development Fees (Table 14)	% Above	$0	$3	$8,557	$9,070	$9,614	$10,191	$10,802	$11,450	$12,136	$12,864	$13,636	$14,454
Interest Income	N.A.	$0	$262	$130	$1,769	$3,458	$4,177	$4,258	$3,886	$3,676	$3,820	$4,262	$4,939
Increase in Non-payment (a Loss) Due to Rate (Bill) Increases Each Year, Estimated at 25 Percent of the Average Rate Increase Each Year	25.0%	$0	$0	-$74,832	-$7,253	-$7,688	-$8,149	-$8,638	-$9,156	-$9,705	-$10,287	-$10,904	-$11,558
Subsidy From the Business Council to NAU	N.A.	$528,942	$516,133	$500,000	$375,000	$250,000	$125,000	$0	$0	$0	$0	$0	$0
Income Increase From Stepped Up Billing and Collection From Existing Customers (Not Rate Increase Income, See Narrative Report)	N.A.	$0	$0	$24,417	$77,645	$137,170	$203,556	$215,764	$228,705	$242,421	$256,960	$272,372	$288,707
Total Operating Incomes		**$725,942**	**$714,281**	**$946,619**	**$973,867**	**$941,235**	**$916,363**	**$838,655**	**$888,326**	**$941,161**	**$997,531**	**$1,057,571**	**$1,121,421**

Table 4 - Operating Costs and Net Income

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-8, Low Staffing, Stop Subsidies

This table depicts expenses during the test year, this year and for the next 10 years. Some future costs will experience inflation. Those costs that go up as use goes up are increased by the cost inflation factor plus the growth rate in users.

(First year costs and net incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Ethete System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$336,442	$346,536	$356,932	$367,640	$378,669	$390,029	$401,730	$413,782	$426,195	$438,981	$452,151	$465,715
Arapahoe System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$363,260	$374,158	$385,383	$396,944	$408,853	$421,118	$433,752	$446,764	$460,167	$473,972	$488,192	$502,837
Additional Cost to Bring Utility to Full Staffing, Including Effects of Salary and Benefits Inflation	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
One-time Reduction of R&R Annuity	0.0%	-$40,378	-$40,378	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Payment to R&R Reserve (Table 7)	0.0%	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378
User Charge Analysis Services	5.0%	$0	$6,862	$0	$0	$7,565	$0	$0	$8,341	$0	$0	$9,196	$0
Total CIP-related Payouts	N.A.	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5
Total Operating Costs		**$699,703**	**$727,556**	**$782,692**	**$804,962**	**$835,465**	**$851,525**	**$875,860**	**$909,265**	**$926,740**	**$953,331**	**$989,916**	**$1,008,930**
Net Income (or Loss)		$26,239	-$13,275	$163,927	$168,905	$105,771	$64,838	-$37,205	-$20,939	$14,420	$44,199	$67,656	$112,491
Working Capital Goal: 50% In Dollars, That is:		$349,851	$363,778	$391,346	$402,481	$417,732	$425,763	$437,930	$454,632	$463,370	$476,666	$494,958	$504,465

Notes: Operating costs for each system came from the engineering reports written a decade ago, and have been increased to the present by a two percent annual inflation factor.

Table 17 - Financial Capacity Indicators and Reserves

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-8, Low Staffing, Stop Subsidies

This table depicts the affordability of future rates, the financial health of the system and the ending balances in various (assumed) accounts for the test year and the next 10 years.

Capacity Indicators	Test Year Starting 1/1/18	0 Year Starting 1/1/19	1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Customary Affordability Index: Monthly Bill for a 5,000 gal per Month Residential Customer	$20.00	$44.55	$44.55	$46.77	$49.11	$51.57	$54.15	$56.85	$59.70	$62.68	$65.82	$69.11
AMHI Within Service Area	$49,453	$50,327	$51,217	$52,122	$53,043	$53,981	$54,935	$55,906	$56,894	$57,900	$58,923	$59,964
Affordability Index: Current Rates First Column, Modeled Rates After That	0.49%	1.06%	1.04%	1.08%	1.11%	1.15%	1.18%	1.22%	1.26%	1.30%	1.34%	1.38%
Affordability Index (AI) goes to the willingness and ability of customers to pay. AI is the cost of 60,000 gallons of residential service per year (5,000 gallons per month) divided by the Annual Median Household Income (AMHI) in the service area (gleaned from Census data or a survey). Rates near 1.0% are common in the U.S. and are generally considered affordable. Most grant agencies will not consider awarding grants if this indicator is less than 1.5 to 2.0%.												
Low-income, Low-volume Affordability Index: Monthly Bill for a 2,000 gal per Month Residential Customer	$20.00	$44.55	$44.55	$46.77	$49.11	$51.57	$54.15	$56.85	$59.70	$62.68	$65.82	$69.11
Income at One-half the AMHI and Rising at One-half the Rate Above	$24,726	$24,945	$25,165	$25,388	$25,612	$25,839	$26,067	$26,297	$26,530	$26,764	$27,001	$27,239
Affordability for Low-income, Low-volume: Current Rates First Column, Modeled Rates After That	0.97%	2.14%	2.12%	2.21%	2.30%	2.39%	2.49%	2.59%	2.70%	2.81%	2.93%	3.04%
This additional indicator of affordability assumes a residential customer with income at one-half of the median household income above, that income is growing at one-half the rate of the median household income and the customer uses 2,000 gallons per month. Such a customer is likely either a minimum wage or near-minimum wage worker, or is retired and living only on Social Security benefits. Such customers are more commonly the "slow pays" and "no pays" compared to others.												
Estimated Operating Ratio: Current Rates First Column, Modeled Rates After That	1.04	0.98	1.21	1.21	1.13	1.08	0.96	0.98	1.02	1.05	1.07	1.11
Operating ratio (OR) is a measure of the utility's ability to pay its operating expenses using only current incomes. A 1.0 OR is break even. Below 1.0 indicates operating in the "red." Generally, the OR should be at least 1.15 for large systems, 1.30 or more for medium-sized systems and perhaps as high as 2.0 for small systems. Note: If the utility has or will have reserves (below,) it has more ability to pay its operating costs than the OR implies.												
Estimated Coverage Ratio: Current Rates First Column, Modeled Rates After That	N.A.	N.A.	N.A.	N.A.	N.A.	9.51	0.00	0.00	0.00	0.00	0.00	17.06
Coverage Ratio (CR) goes to the ability of the utility to pay its debt payments out of current incomes. OR applies only to years with debt service. 1.0 is break even. Generally, the CR should be at least 1.25. Note: If the utility has or will have reserves (shown below,) it has more ability to make debt payments than the CR implies.												

Reserves	Balance Ending on 12/31/18	Balance Ending on 12/31/19	Balance Ending on 12/31/20	Balance Ending on 12/31/21	Balance Ending on 12/31/22	Balance Ending on 12/31/23	Balance Ending on 12/31/24	Balance Ending on 12/31/25	Balance Ending on 12/31/26	Balance Ending on 12/31/27	Balance Ending on 12/31/28	Balance Ending on 12/31/29
Cash and Cash Equivalents	$26,239	$12,964	$176,891	$345,796	$417,732	$425,763	$388,558	$367,619	$382,039	$426,239	$493,894	$504,465
Other Liquid Assets	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Undedicated Cash Assets	$26,239	$12,964	$176,891	$345,796	$417,732	$425,763	$388,558	$367,619	$382,039	$426,239	$493,894	$504,465
Total Cash Assets Discounted for Inflation (Future Unrestricted Purchasing Power)	$26,239	$12,964	$171,584	$325,360	$381,253	$376,925	$333,668	$306,216	$308,681	$334,062	$375,474	$383,510
Repair & Replacement	-$26,239	-$13,412	-$1,139	$10,544	$21,601	$31,992	$41,679	$50,620	$58,772	$66,089	$72,526	$78,034
Debt and CIP Reserves	$0	$0	$0	$0	$33,835	$85,344	$81,075	$76,721	$72,280	$67,750	$63,130	$160,337
Sum of All Reserves	$0	-$447	$175,752	$356,340	$473,167	$543,099	$511,312	$494,960	$513,091	$560,078	$629,550	$742,836

Table 18 - Bills Before and After Rate Adjustments

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-8, Low Staffing, Stop Subsidies

Overall effective rate increase	126.7%

The revenue increase above includes meter size-based minimum charges calculated in Table 15, to be assessed to commercial customers only.

This table shows residential customer flat rates, which accounts for nearly all customers.

Customer, Rate Class or Meter Size	Current Bill	Modeled Bill	Modeled Bill Increase or Decrease (-)
Residential Customer	$20.00	$44.55	$24.55

Chart 1 - Operating Ratio

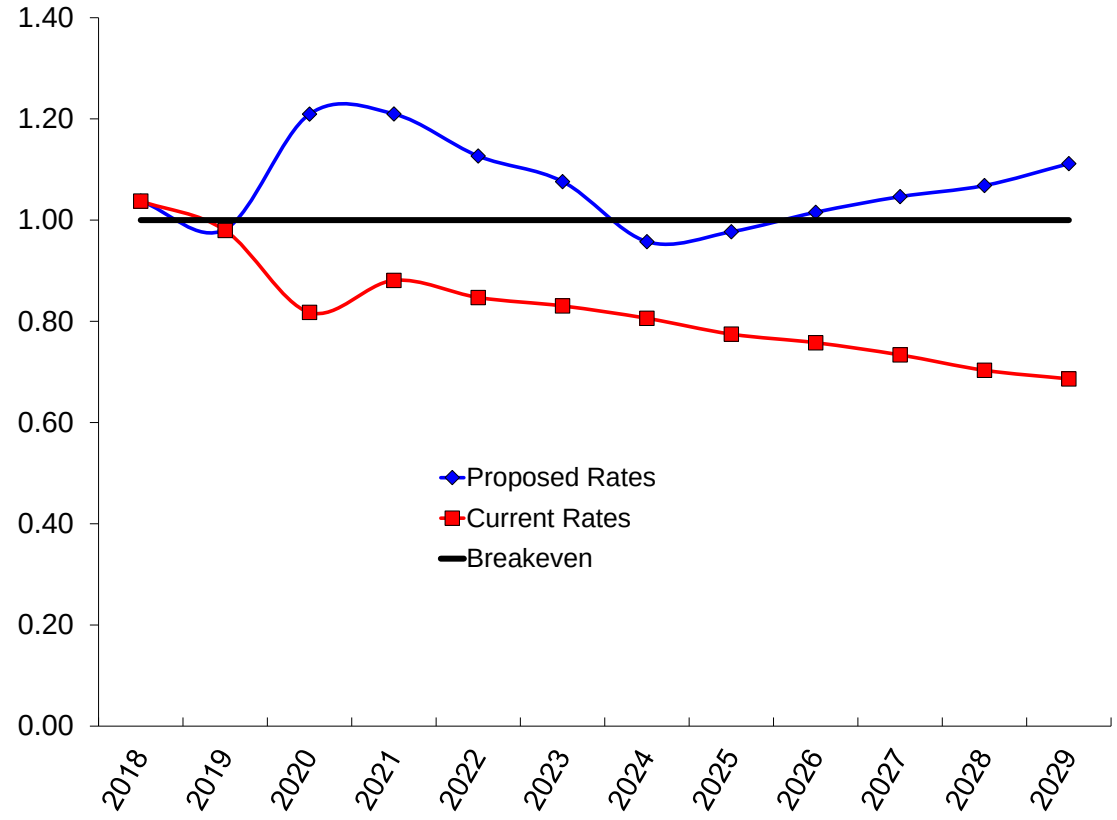


Chart 2 - Coverage Ratio

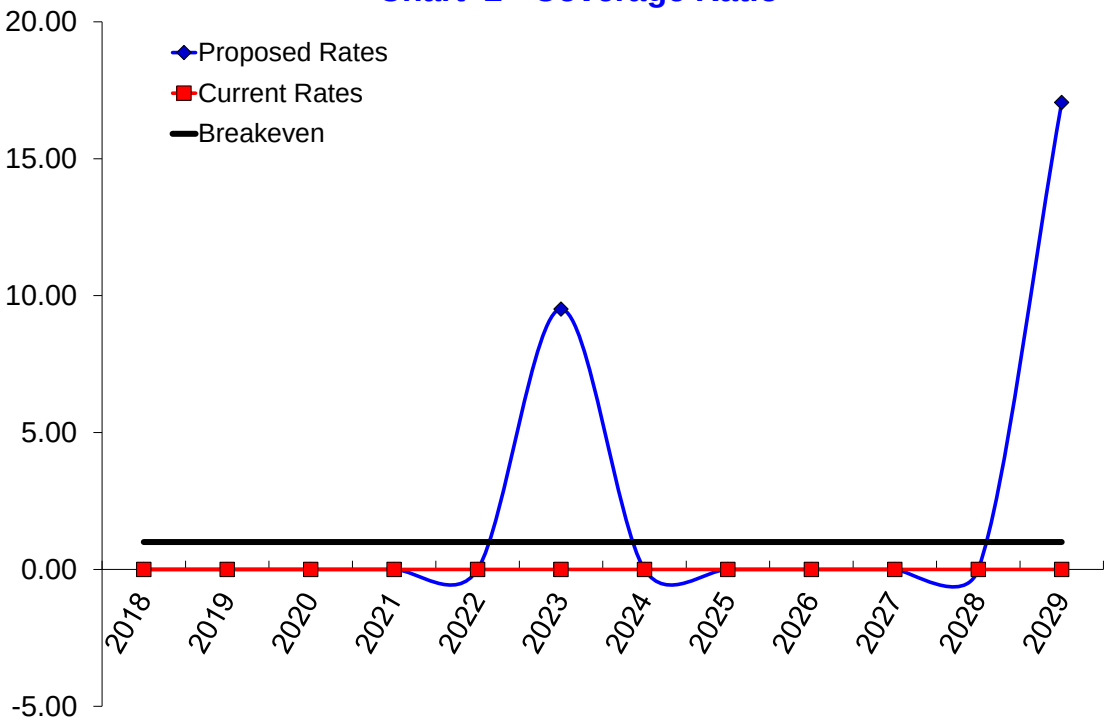


Chart 3 - Residential Users' Bills

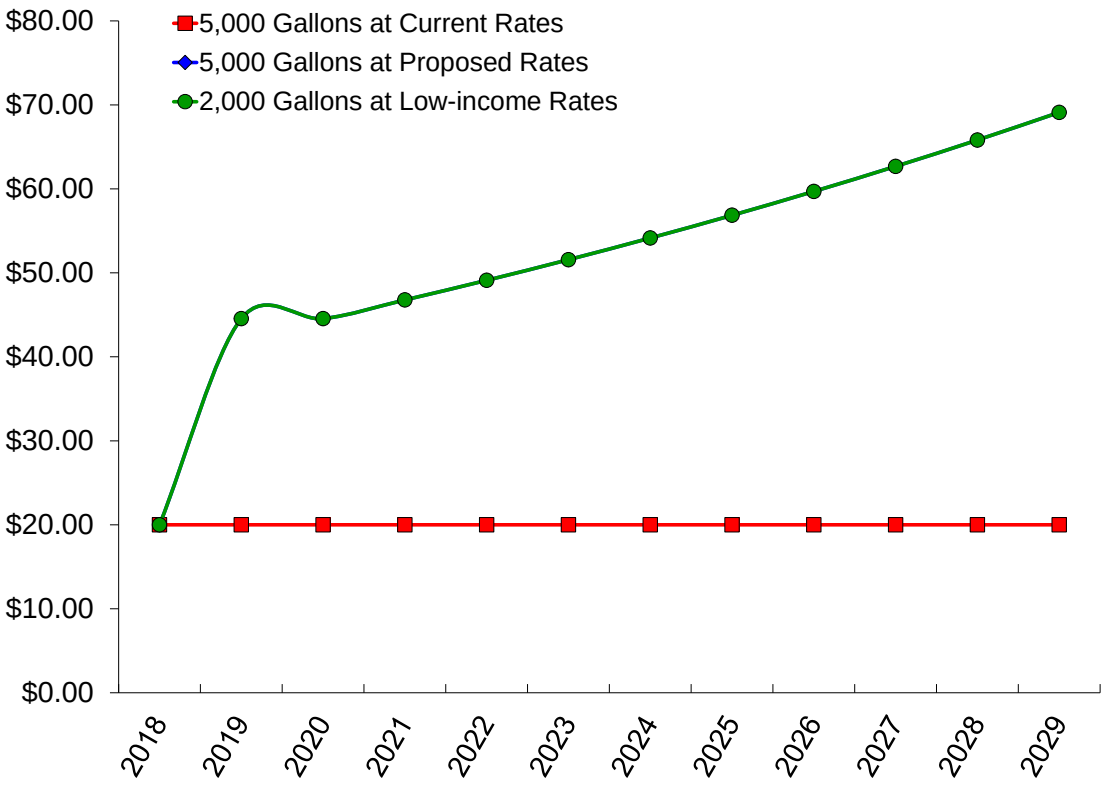


Chart 4 - Affordability

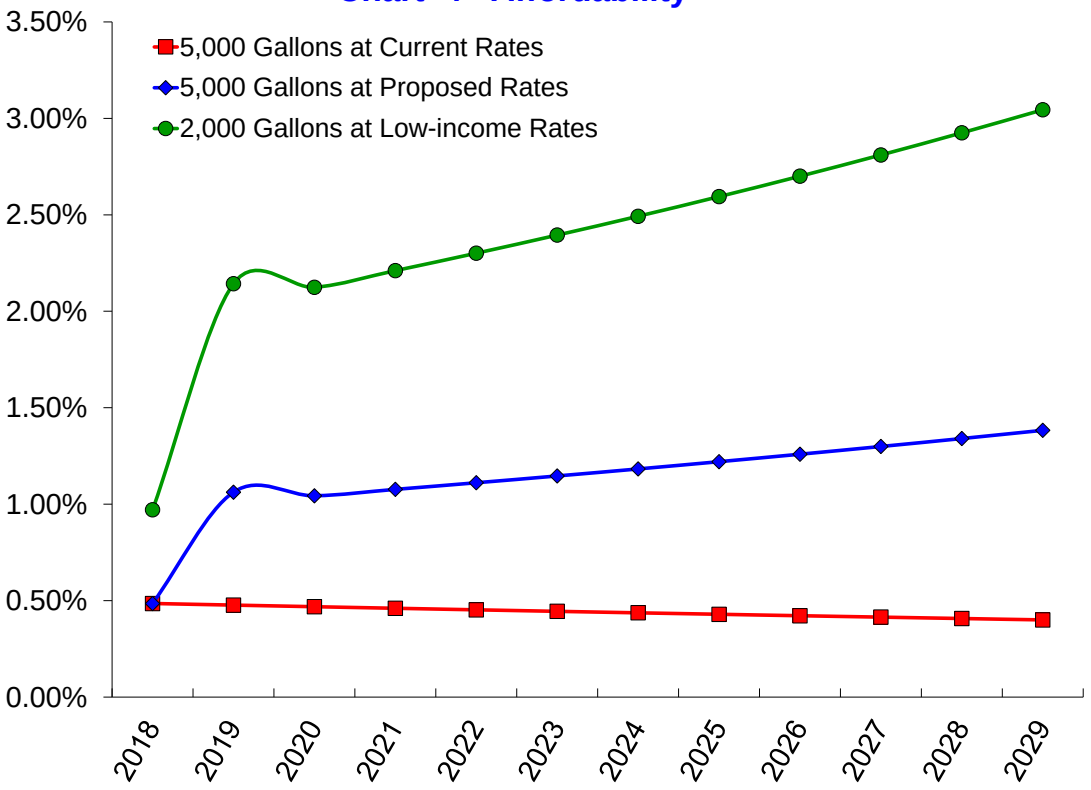


Chart 5 - Working Capital vs Goal

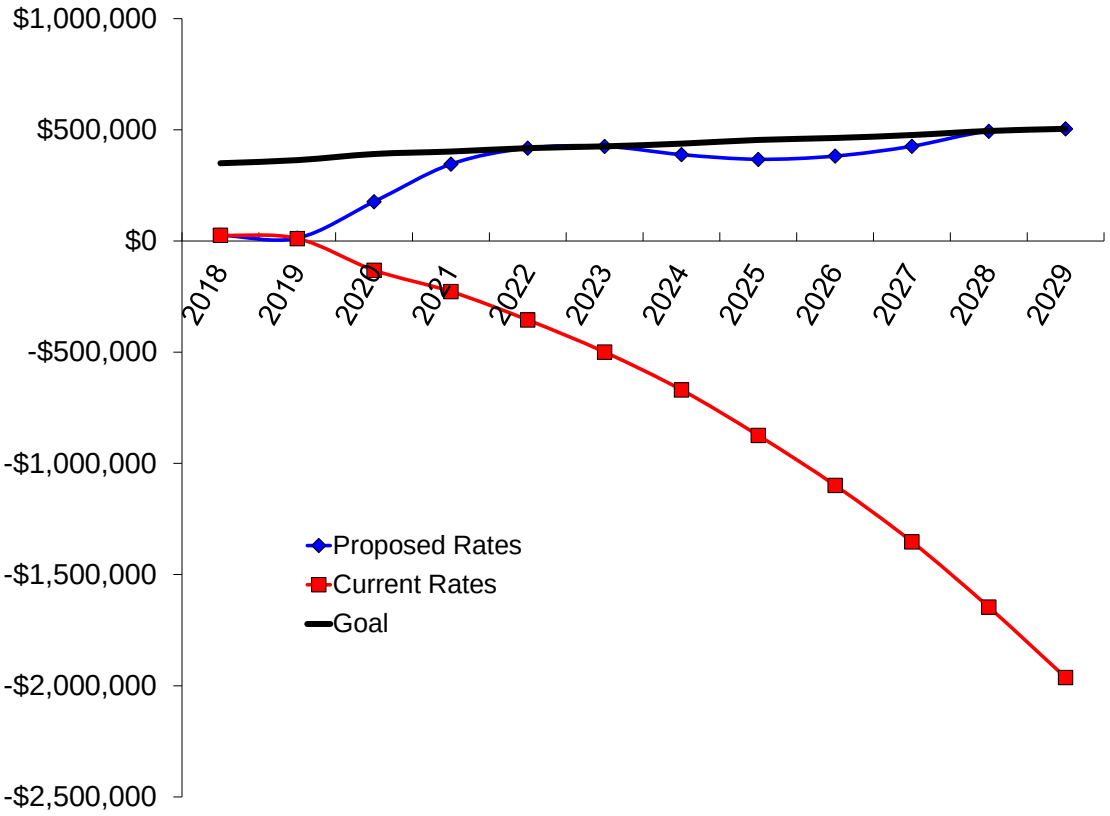


Chart 6 - Value of Cash Assets Before Inflation

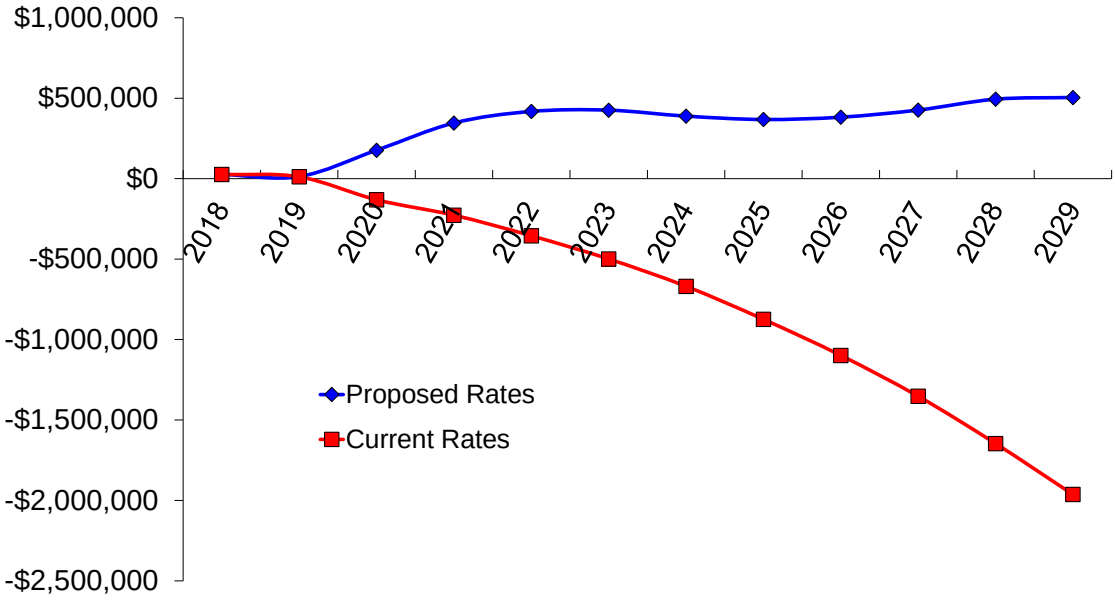


Chart 7 - Value of Cash Assets After Inflation

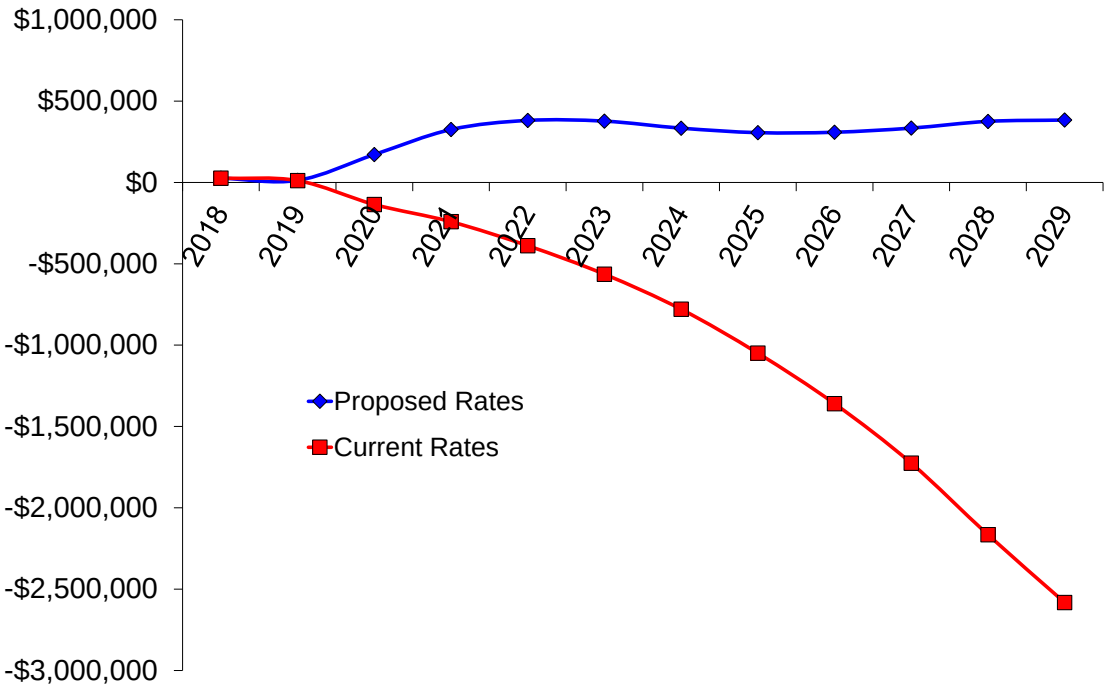
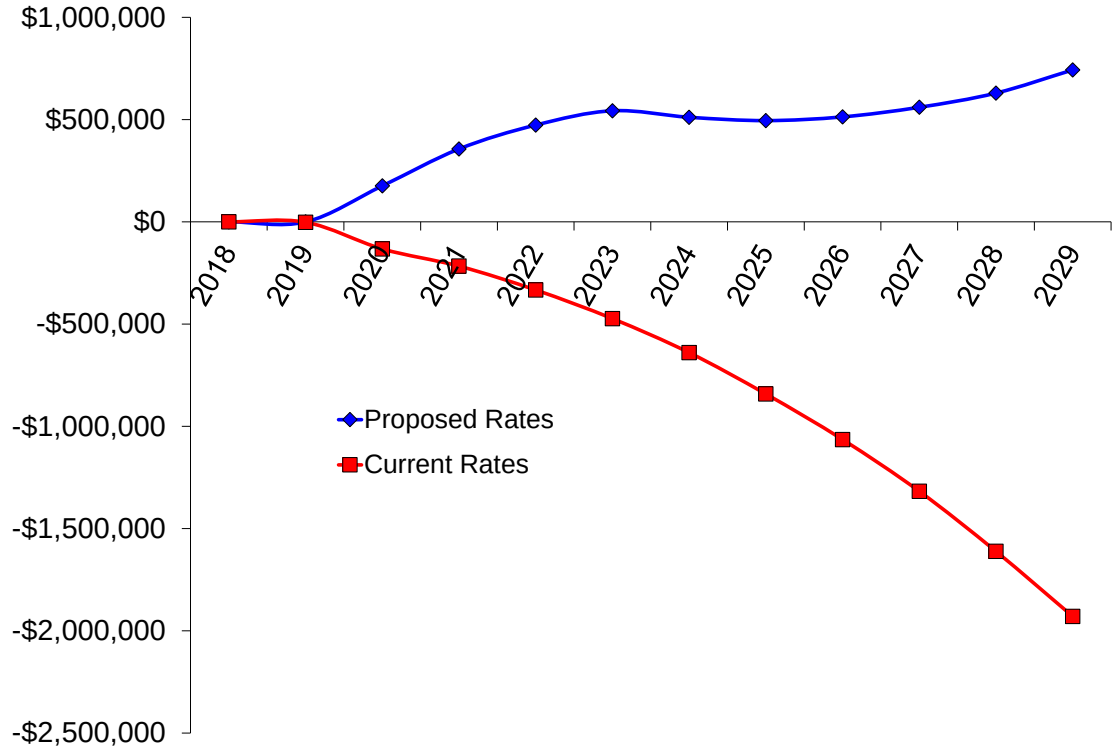


Chart 8 - Sum of All Reserves



Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-9, Full Staffing, Keep Subsidies

This model assumes full staffing of the utility, and subsidies from the Business Council will continue, increasing every year at the same rates that customer rates increase (5%).

October 28, 2019

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Note: This document is a print out of the spreadsheet model used to calculate new user charge and other rates and fees for the next 10 years. These calculations are complex and are based upon many conditions and assumtions. These issues, and others, are described in a narrative report that accompanies this model.

Table 3 - Operating Incomes and Basic User Data

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-9, Full Staffing, Keep Subsidies

This table depicts user statistics, customer growth, and system incomes and across the board "inflationary" style rate increases through the 10th year.

Annual Median Household Income (AMHI)

$48,594	Census Bureau estimate of AMHI for the year	2017
$47,750	Census Bureau estimate of AMHI for the year	2016
$844	AMHI growth during this time period	
1.77%	Simple annual income growth rate during this time period (used to project incomes into the future)	

Test Year Growth of Customer Base and Average Tap Fee Paid per Connection

1 Number of new connections made during the test year

$0 Average tap or installation fee assessed during the test year

This model is programmed for rates to be reset in the "Analysis Year," also called the "0 Year" column below (heading highlighted blue). Revenues will be collected at the now-current rates for the first part of the analysis year and the modeled rates for the last part of the analysis year. Thus, the revenues shown in the last column of that table are "blended" revenues; part collected at the old rates and part collected at the new rates. It was then assumed that all rate adjustments made after the initial (major) adjustment will be done annually on approximately the anniversary of the first adjustment. If rates will not be adjusted during the "0 Year," an adjustment (normally a revenue reduction) was calculated below to account for the late start in making the first adjustments.

Basic User (Customer) Data

(First year balances and incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Across-the-Board Rate Increases Projected for Years After the Initial Adjustment Year (1st Year)	N.A.	N.A.	N.A.	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
				The row above shows the rate at which user charge fees should be increased for each year beyond the initial rate adjustment year. Unless stated otherwise, these should be across-the-board increases to all rates and fees and that should continue until a new rate analysis is done.									
Average Number of Customers for the Year	N.A.	900	901	910	918	927	936	945	954	963	972	981	990
Customers Added or Lost (-) During the Year	N.A.	1.0	1.0	8.6	8.6	8.7	8.8	8.9	9.0	9.1	9.1	9.2	9.3
Customer Growth Rate (from Engineering Reports)	N.A.	0.11%	0.11%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%
Actual (Test Year) and Projected Volumes, in Gallons	N.A.	76,272,000	76,356,747	77,082,136	77,814,416	78,553,653	79,299,913	80,053,262	80,813,768	81,581,499	82,356,523	83,138,910	83,928,730
How User Charge Fees Were Calculated, Accounting for New Customers and Future Rate Increases													
Actual or Calculated Sales Revenues		$183,600	$184,030	$340,483	$360,903	$382,548	$405,492	$429,811	$455,589	$482,913	$511,875	$542,575	$575,116
Additional Sales Revenues From New Customers			$1	$3,235	$3,429	$3,634	$3,852	$4,083	$4,328	$4,588	$4,863	$5,154	$5,464
Total Calculated Revenues (User Charge Fees)		$183,600	$184,030	$343,717	$364,332	$386,182	$409,344	$433,894	$459,917	$487,500	$516,738	$547,730	$580,580
Operating Incomes													
User Charge Fees (first two years are estimated, next 10 years are calculated and assumed to be fully collectable)	N.A.	$197,000	$197,462	$343,717	$364,332	$386,182	$409,344	$433,894	$459,917	$487,500	$516,738	$547,730	$580,580
Late Payment Charge	N.A.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New Taps or Connections (Current Rate Structure)	% Above	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$2
Meter Size-based System Development Fees (Table 14)	% Above	$0	$3	$8,557	$9,070	$9,614	$10,191	$10,802	$11,450	$12,136	$12,864	$13,636	$14,454
Interest Income	N.A.	$0	$262	$125	-$3,140	-$4,844	-$5,546	-$4,794	-$3,435	-$1,576	$591	$2,366	$4,471
Increase in Non-payment (a Loss) Due to Rate (Bill) Increases Each Year, Estimated at 25 Percent of the Average Rate Increase Each Year	25.0%	$0	$0	-$39,113	-$5,105	-$5,411	-$5,736	-$6,080	-$6,444	-$6,831	-$7,241	-$7,675	-$8,135
Subsidy From the Business Council to NAU	N.A.	$528,942	$516,133	$500,000	$525,000	$551,250	$578,813	$607,753	$638,141	$670,048	$703,550	$738,728	$775,664
Income Increase From Stepped Up Billing and Collection From Existing Customers (Not Rate Increase Income, See Narrative Report)	N.A.	$0	$0	$17,186	$54,650	$96,546	$143,270	$151,863	$160,971	$170,625	$180,858	$191,705	$203,203
Total Operating Incomes		**$725,942**	**$713,860**	**$830,472**	**$944,807**	**$1,033,337**	**$1,130,335**	**$1,193,438**	**$1,260,598**	**$1,331,903**	**$1,407,361**	**$1,486,490**	**$1,570,238**

Table 4 - Operating Costs and Net Income

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-9, Full Staffing, Keep Subsidies

This table depicts expenses during the test year, this year and for the next 10 years. Some future costs will experience inflation. Those costs that go up as use goes up are increased by the cost inflation factor plus the growth rate in users.

(First year costs and net incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Ethete System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$336,442	$346,536	$356,932	$367,640	$378,669	$390,029	$401,730	$413,782	$426,195	$438,981	$452,151	$465,715
Arapahoe System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$363,260	$374,158	$385,383	$396,944	$408,853	$421,118	$433,752	$446,764	$460,167	$473,972	$488,192	$502,837
Additional Cost to Bring Utility to Full Staffing, Including Effects of Salary and Benefits Inflation	3.0%	$0	$0	$217,308	$225,038	$233,001	$241,202	$249,649	$258,350	$267,312	$276,543	$286,050	$295,843
One-time Reduction of R&R Annuity	0.0%	-$40,378	-$40,378	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Payment to R&R Reserve (Table 7)	0.0%	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378
User Charge Analysis Services	5.0%	$0	$6,862	$0	$0	$7,565	$0	$0	$8,341	$0	$0	$9,196	$0
Total CIP-related Payouts	N.A.	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5
Total Operating Costs		**$699,703**	**$727,556**	**$1,000,000**	**$1,030,000**	**$1,068,465**	**$1,092,727**	**$1,125,509**	**$1,167,615**	**$1,194,052**	**$1,229,874**	**$1,275,966**	**$1,304,773**
Net Income (or Loss)		$26,239	-$13,696	-$169,528	-$85,193	-$35,128	$37,608	$67,929	$92,984	$137,851	$177,487	$210,524	$265,465
Working Capital Goal: 50%	In Dollars, That is:	$349,851	$363,778	$500,000	$515,000	$534,233	$546,364	$562,754	$583,807	$597,026	$614,937	$637,983	$652,387

Notes: Operating costs for each system came from the engineering reports written a decade ago, and have been increased to the present by a two percent annual inflation factor.

Table 17 - Financial Capacity Indicators and Reserves

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-9, Full Staffing, Keep Subsidies

This table depicts the affordability of future rates, the financial health of the system and the ending balances in various (assumed) accounts for the test year and the next 10 years.

Capacity Indicators	Test Year Starting 1/1/18	0 Year Starting 1/1/19	1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Customary Affordability Index: Monthly Bill for a 5,000 gal per Month Residential Customer	$20.00	$31.36	$31.36	$32.93	$34.57	$36.30	$38.12	$40.02	$42.02	$44.12	$46.33	$48.65
AMHI Within Service Area	$49,453	$50,327	$51,217	$52,122	$53,043	$53,981	$54,935	$55,906	$56,894	$57,900	$58,923	$59,964
Affordability Index: Current Rates First Column, Modeled Rates After That	0.49%	0.75%	0.73%	0.76%	0.78%	0.81%	0.83%	0.86%	0.89%	0.91%	0.94%	0.97%
Affordability Index (AI) goes to the willingness and ability of customers to pay. AI is the cost of 60,000 gallons of residential service per year (5,000 gallons per month) divided by the Annual Median Household Income (AMHI) in the service area (gleaned from Census data or a survey). Rates near 1.0% are common in the U.S. and are generally considered affordable. Most grant agencies will not consider awarding grants if this indicator is less than 1.5 to 2.0%.												
Low-income, Low-volume Affordability Index: Monthly Bill for a 2,000 gal per Month Residential Customer	$20.00	$31.36	$31.36	$32.93	$34.57	$36.30	$38.12	$40.02	$42.02	$44.12	$46.33	$48.65
Income at One-half the AMHI and Rising at One-half the Rate Above	$24,726	$24,945	$25,165	$25,388	$25,612	$25,839	$26,067	$26,297	$26,530	$26,764	$27,001	$27,239
Affordability for Low-income, Low-volume: Current Rates First Column, Modeled Rates After That	0.97%	1.51%	1.50%	1.56%	1.62%	1.69%	1.75%	1.83%	1.90%	1.98%	2.06%	2.14%
This additional indicator of affordability assumes a residential customer with income at one-half of the median household income above, that income is growing at one-half the rate of the median household income and the customer uses 2,000 gallons per month. Such a customer is likely either a minimum wage or near-minimum wage worker, or is retired and living only on Social Security benefits. Such customers are more commonly the "slow pays" and "no pays" compared to others.												
Estimated Operating Ratio: Current Rates First Column, Modeled Rates After That	1.04	0.98	0.83	0.92	0.97	1.03	1.06	1.08	1.12	1.14	1.16	1.20
Operating ratio (OR) is a measure of the utility's ability to pay its operating expenses using only current incomes. A 1.0 OR is break even. Below 1.0 indicates operating in the "red." Generally, the OR should be at least 1.15 for large systems, 1.30 or more for medium-sized systems and perhaps as high as 2.0 for small systems. Note: If the utility has or will have reserves (below,) it has more ability to pay its operating costs than the OR implies.												
Estimated Coverage Ratio: Current Rates First Column, Modeled Rates After That	N.A.	N.A.	N.A.	N.A.	N.A.	0.00	0.00	0.00	0.00	0.00	0.00	10.07
Coverage Ratio (CR) goes to the ability of the utility to pay its debt payments out of current incomes. OR applies only to years with debt service. 1.0 is break even. Generally, the CR should be at least 1.25. Note: If the utility has or will have reserves (shown below,) it has more ability to make debt payments than the CR implies.												

Reserves	Balance Ending on 12/31/18	Balance Ending on 12/31/19	Balance Ending on 12/31/20	Balance Ending on 12/31/21	Balance Ending on 12/31/22	Balance Ending on 12/31/23	Balance Ending on 12/31/24	Balance Ending on 12/31/25	Balance Ending on 12/31/26	Balance Ending on 12/31/27	Balance Ending on 12/31/28	Balance Ending on 12/31/29
Cash and Cash Equivalents	$26,239	$12,543	-$156,985	-$242,178	-$277,306	-$239,698	-$171,768	-$78,785	$59,066	$236,553	$447,077	$652,387
Other Liquid Assets	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Undedicated Cash Assets	$26,239	$12,543	-$156,985	-$242,178	-$277,306	-$239,698	-$171,768	-$78,785	$59,066	$236,553	$447,077	$652,387
Total Cash Assets Discounted for Inflation (Future Unrestricted Purchasing Power)	$26,239	$12,543	-$161,840	-$257,390	-$303,839	-$270,755	-$200,025	-$94,583	$47,724	$185,397	$339,882	$495,965
Repair & Replacement	-$26,239	-$13,412	-$1,139	$10,544	$21,601	$31,992	$41,679	$50,620	$58,772	$66,089	$72,526	$78,034
Debt and CIP Reserves	$0	$0	$0	$0	$0	-$5,975	-$12,070	-$18,287	-$24,628	-$31,096	-$37,694	$15,732
Sum of All Reserves	$0	-$869	-$158,124	-$231,634	-$255,706	-$213,681	-$142,160	-$46,452	$93,209	$271,546	$481,910	$746,153

Table 18 - Bills Before and After Rate Adjustments

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-9, Full Staffing, Keep Subsidies

Overall effective rate increase	67.8%

The revenue increase above includes meter size-based minimum charges calculated in Table 15, to be assessed to commercial customers only.

This table shows residential customer flat rates, which accounts for nearly all customers.

Customer, Rate Class or Meter Size	Current Bill	Modeled Bill	Modeled Bill Increase or Decrease (-)
Residential Customer	$20.00	$31.36	$11.36

Chart 1 - Operating Ratio

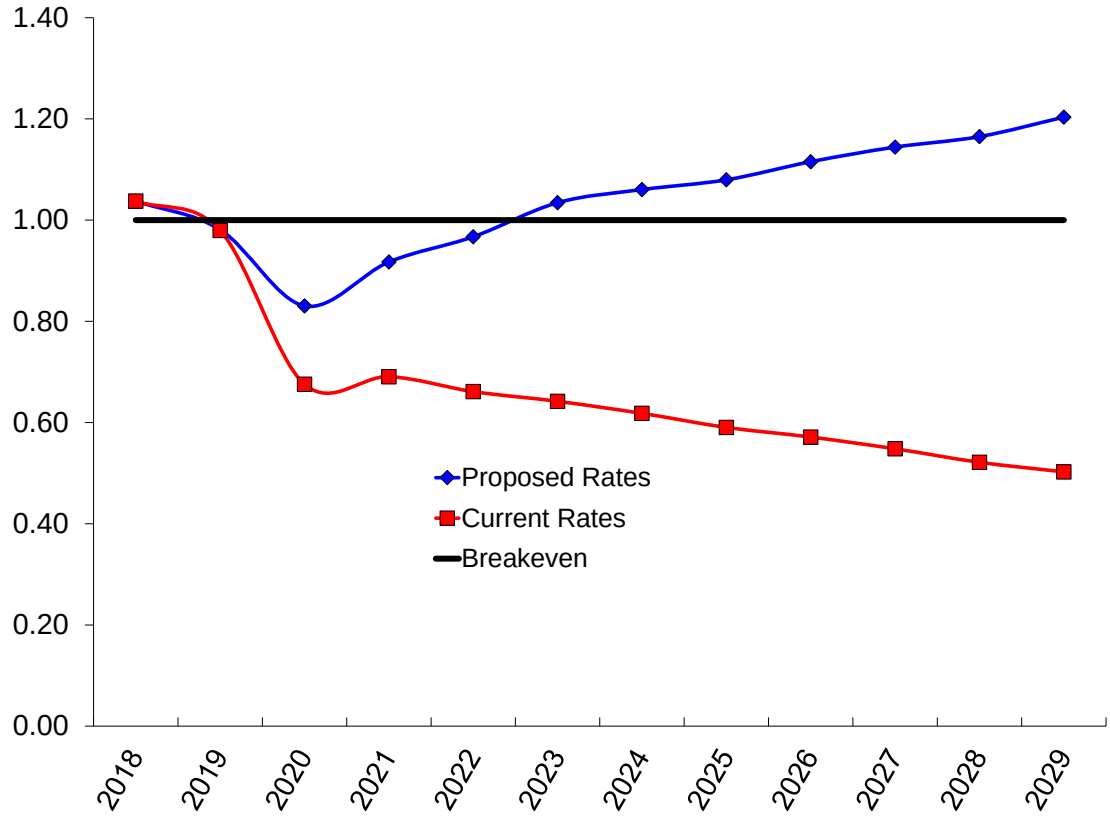


Chart 2 - Coverage Ratio

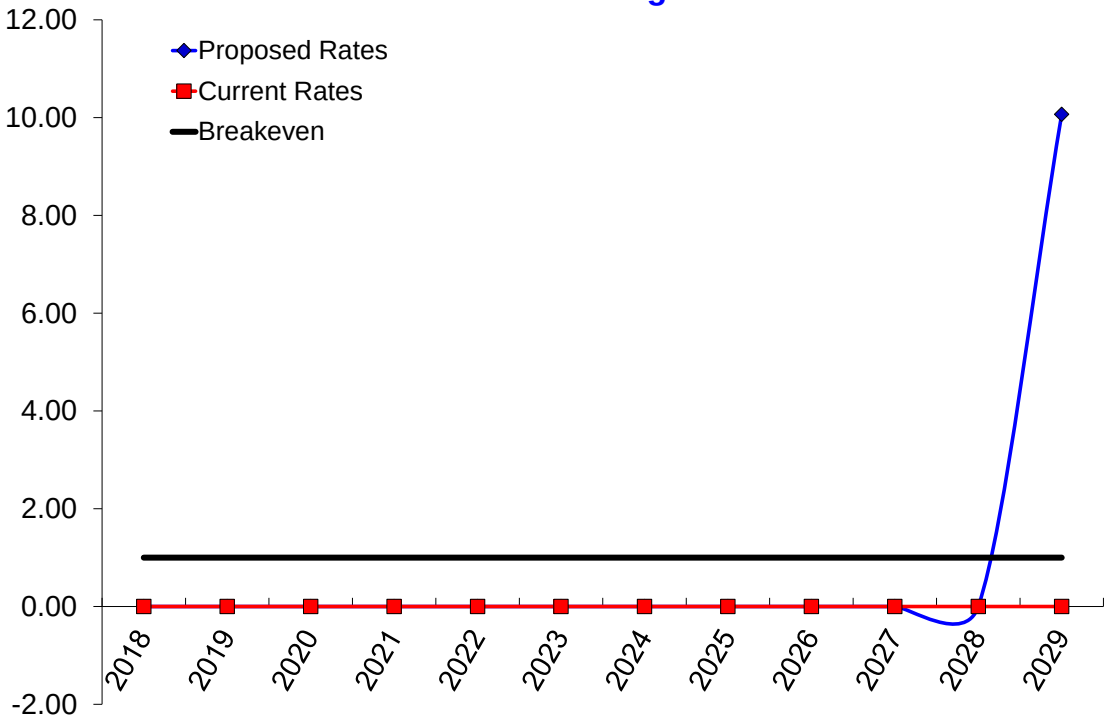


Chart 3 - Residential Users' Bills

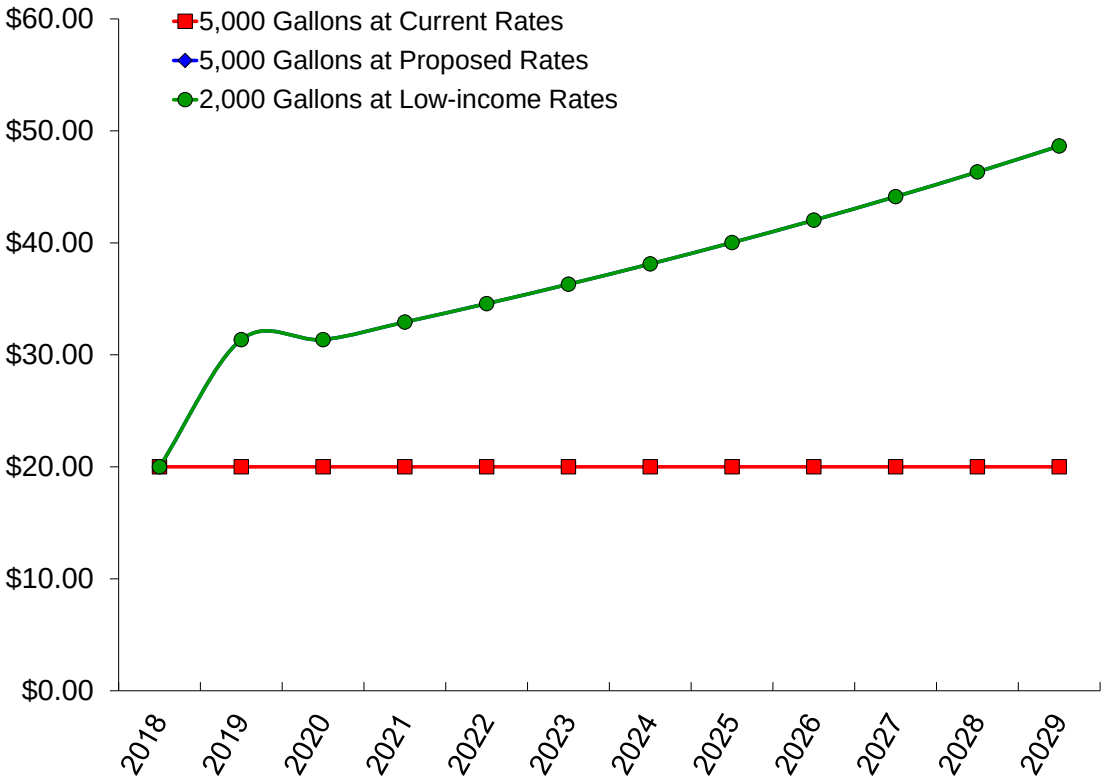


Chart 4 - Affordability

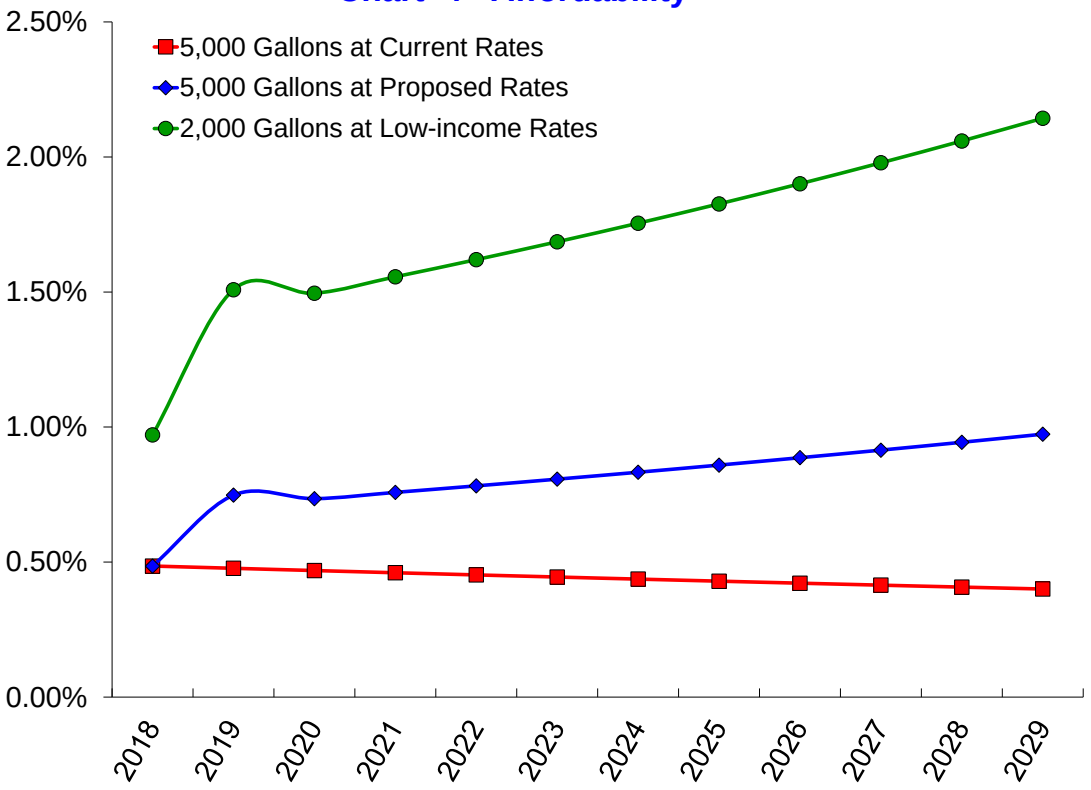


Chart 5 - Working Capital vs Goal

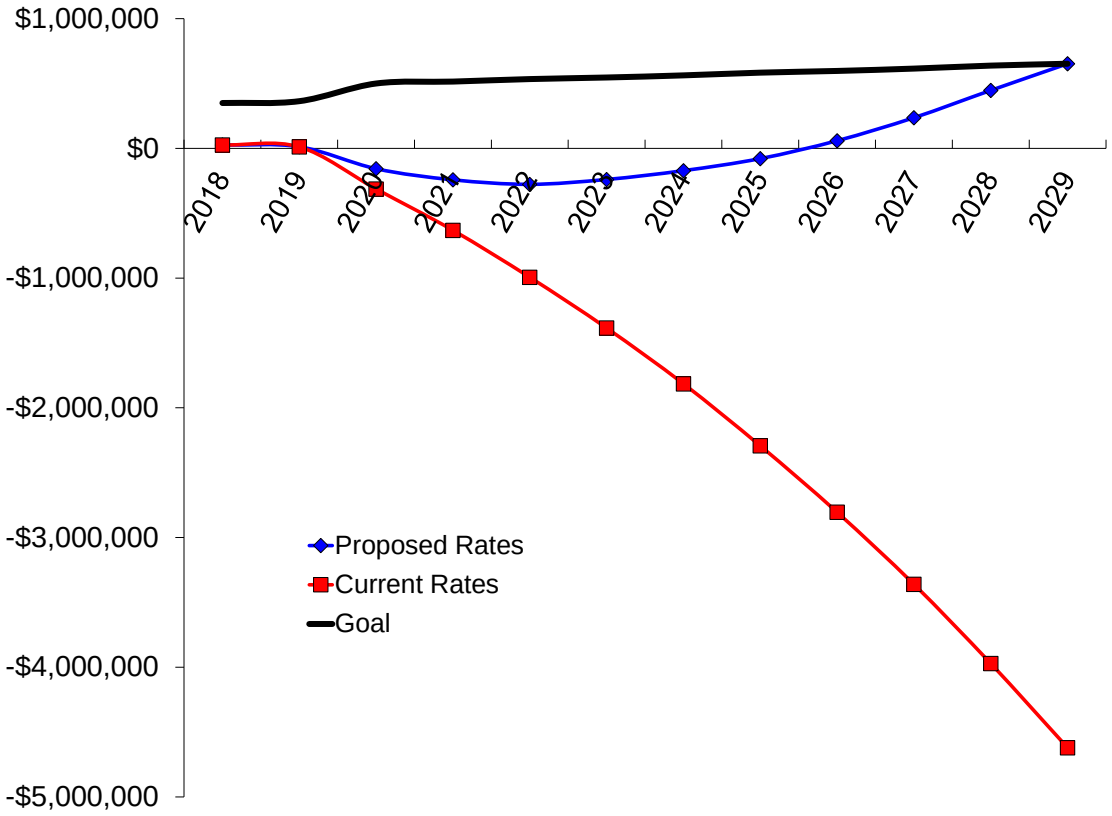


Chart 6 - Value of Cash Assets Before Inflation

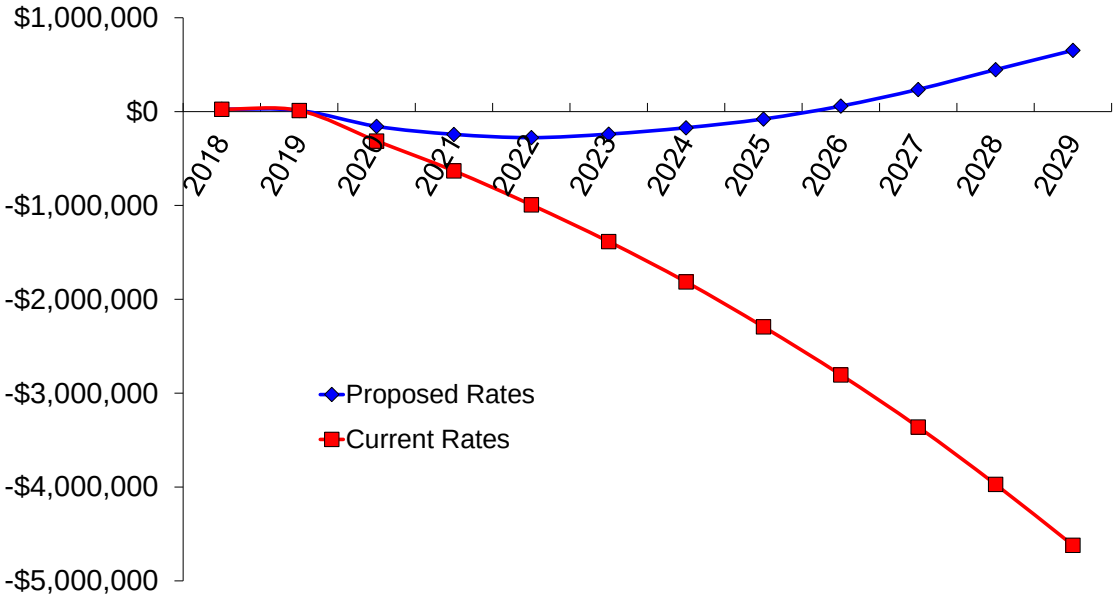


Chart 7 - Value of Cash Assets After Inflation

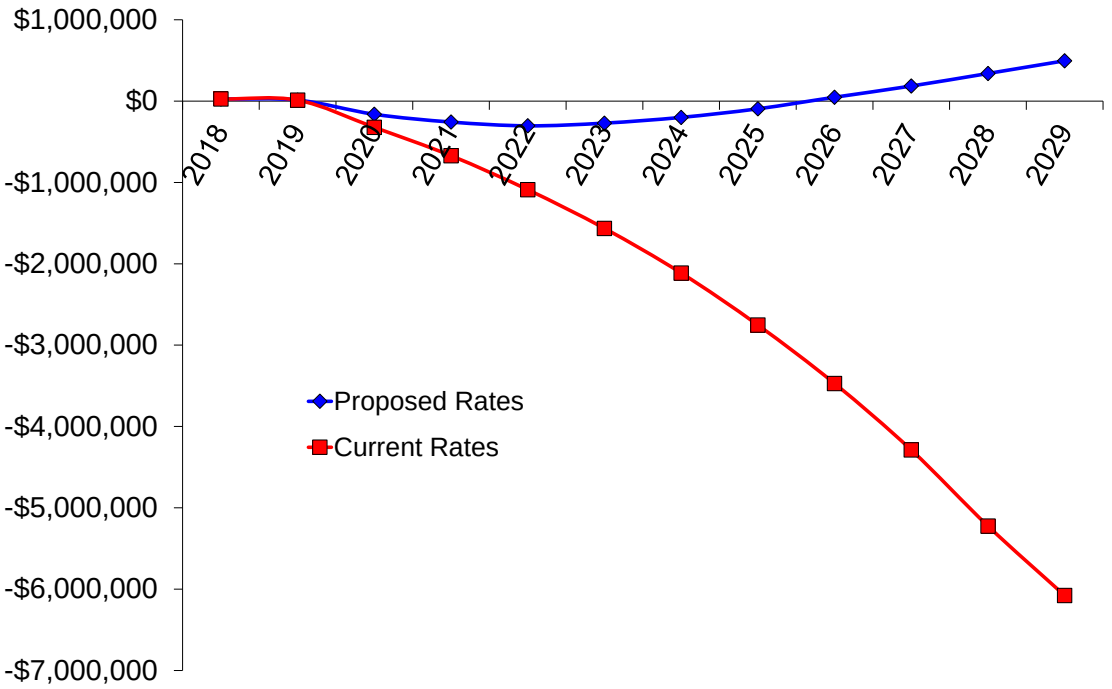
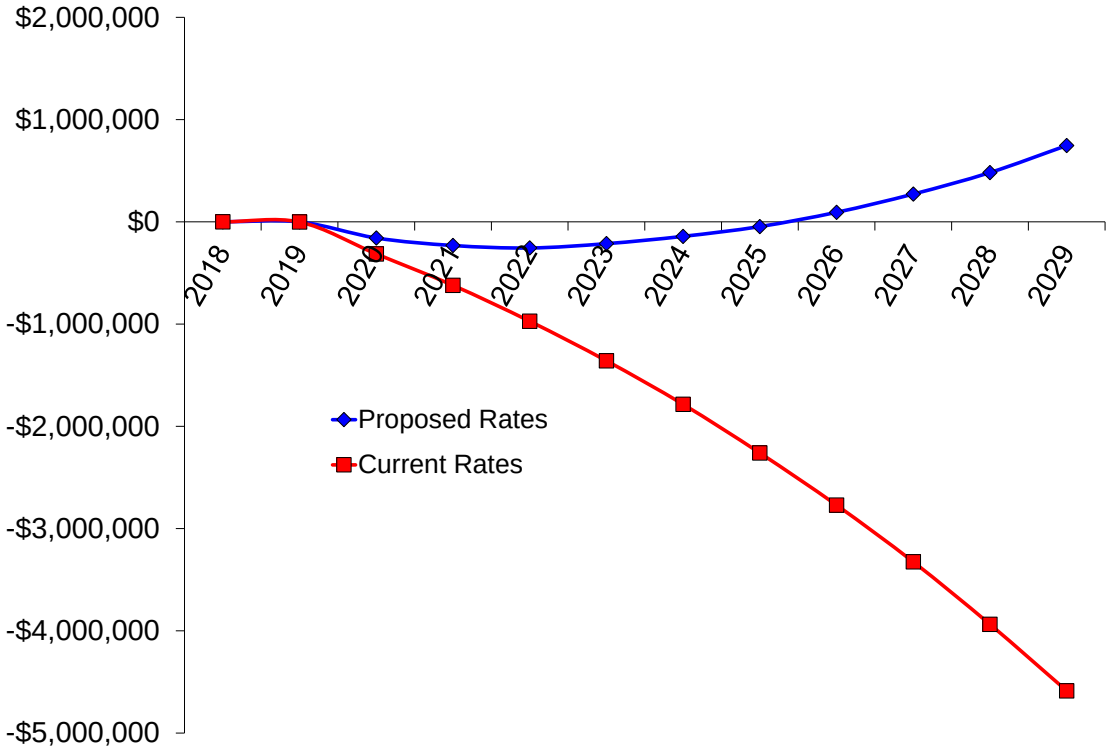


Chart 8 - Sum of All Reserves



Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-10, Low Staffing, Keep Subsidies

This model assumes staffing of the utility will be kept low, and subsidies from the Business Council will continue, increasing every year at the same rates that customer rates increase (5%).

October 28, 2019

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Note: This document is a print out of the spreadsheet model used to calculate new user charge and other rates and fees for the next 10 years. These calculations are complex and are based upon many conditions and assumtions. These issues, and others, are described in a narrative report that accompanies this model.

Table 3 - Operating Incomes and Basic User Data

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-10, Low Staffing, Keep Subsidies

This table depicts user statistics, customer growth, and system incomes and across the board "inflationary" style rate increases through the 10th year.

Annual Median Household Income (AMHI)

$48,594	Census Bureau estimate of AMHI for the year	2017
$47,750	Census Bureau estimate of AMHI for the year	2016
$844	AMHI growth during this time period	
1.77%	Simple annual income growth rate during this time period (used to project incomes into the future)	

Test Year Growth of Customer Base and Average Tap Fee Paid per Connection

1 Number of new connections made during the test year

$0 Average tap or installation fee assessed during the test year

This model is programmed for rates to be reset in the "Analysis Year," also called the "0 Year" column below (heading highlighted blue). Revenues will be collected at the now-current rates for the first part of the analysis year and the modeled rates for the last part of the analysis year. Thus, the revenues shown in the last column of that table are "blended" revenues; part collected at the old rates and part collected at the new rates. It was then assumed that all rate adjustments made after the initial (major) adjustment will be done annually on approximately the anniversary of the first adjustment. If rates will not be adjusted during the "0 Year," an adjustment (normally a revenue reduction) was calculated below to account for the late start in making the first adjustments.

Basic User (Customer) Data

(First year balances and incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Across-the-Board Rate Increases Projected for Years After the Initial Adjustment Year (1st Year)	N.A.	N.A.	N.A.	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
				The row above shows the rate at which user charge fees should be increased for each year beyond the initial rate adjustment year. Unless stated otherwise, these should be across-the-board increases to all rates and fees and that should continue until a new rate analysis is done.									
Average Number of Customers for the Year	N.A.	900	901	910	918	927	936	945	954	963	972	981	990
Customers Added or Lost (-) During the Year	N.A.	1.0	1.0	8.6	8.6	8.7	8.8	8.9	9.0	9.1	9.1	9.2	9.3
Customer Growth Rate (from Engineering Reports)	N.A.	0.11%	0.11%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%	0.95%
Actual (Test Year) and Projected Volumes, in Gallons	N.A.	76,272,000	76,356,747	77,082,136	77,814,416	78,553,653	79,299,913	80,053,262	80,813,768	81,581,499	82,356,523	83,138,910	83,928,730
How User Charge Fees Were Calculated, Accounting for New Customers and Future Rate Increases													
Actual or Calculated Sales Revenues		$183,600	$183,613	$188,221	$199,509	$211,475	$224,158	$237,602	$251,852	$266,957	$282,968	$299,939	$317,928
Additional Sales Revenues From New Customers			$1	$1,788	$1,895	$2,009	$2,130	$2,257	$2,393	$2,536	$2,688	$2,849	$3,020
Total Calculated Revenues (User Charge Fees)		$183,600	$183,613	$190,009	$201,405	$213,484	$226,288	$239,859	$254,245	$269,493	$285,656	$302,788	$320,948
Operating Incomes													
User Charge Fees (first two years are estimated, next 10 years are calculated and assumed to be fully collectable)	N.A.	$197,000	$197,014	$190,009	$201,405	$213,484	$226,288	$239,859	$254,245	$269,493	$285,656	$302,788	$320,948
Late Payment Charge	N.A.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
New Taps or Connections (Current Rate Structure)	% Above	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1	$2
Meter Size-based System Development Fees (Table 14)	% Above	$0	$3	$8,557	$9,070	$9,614	$10,191	$10,802	$11,450	$12,136	$12,864	$13,636	$14,454
Interest Income	N.A.	$0	$262	$121	-$1,271	-$2,139	-$2,396	-$1,648	-$418	$587	$1,747	$3,212	$4,914
Increase in Non-payment (a Loss) Due to Rate (Bill) Increases Each Year, Estimated at 25 Percent of the Average Rate Increase Each Year	25.0%	$0	$0	-$1,152	-$2,822	-$2,991	-$3,171	-$3,361	-$3,563	-$3,776	-$4,003	-$4,243	-$4,497
Subsidy From the Business Council to NAU	N.A.	$528,942	$516,133	$500,000	$525,000	$551,250	$578,813	$607,753	$638,141	$670,048	$703,550	$738,728	$775,664
Income Increase From Stepped Up Billing and Collection From Existing Customers (Not Rate Increase Income, See Narrative Report)	N.A.	$0	$0	$9,500	$30,211	$53,371	$79,201	$83,951	$88,986	$94,323	$99,980	$105,976	$112,332
Total Operating Incomes		**$725,942**	**$713,412**	**$707,035**	**$761,592**	**$822,589**	**$888,924**	**$937,356**	**$988,840**	**$1,042,810**	**$1,099,795**	**$1,160,098**	**$1,223,816**

Table 4 - Operating Costs and Net Income

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-10, Low Staffing, Keep Subsidies

This table depicts expenses during the test year, this year and for the next 10 years. Some future costs will experience inflation. Those costs that go up as use goes up are increased by the cost inflation factor plus the growth rate in users.

(First year costs and net incomes are actual, subsequent years are projected.)	Inflation/ Deflation (–) Factor	Test Year Starting 1/1/18	Analysis Year 0 Year Starting 1/1/19	Years Following the Analysis Year (for Which Results Have Been Projected) 1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Ethete System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$336,442	$346,536	$356,932	$367,640	$378,669	$390,029	$401,730	$413,782	$426,195	$438,981	$452,151	$465,715
Arapahoe System Operating Costs, 2008 + 2% Annual Inflation to 2018	3.0%	$363,260	$374,158	$385,383	$396,944	$408,853	$421,118	$433,752	$446,764	$460,167	$473,972	$488,192	$502,837
Additional Cost to Bring Utility to Full Staffing, Including Effects of Salary and Benefits Inflation	3.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
One-time Reduction of R&R Annuity	0.0%	-$40,378	-$40,378	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Payment to R&R Reserve (Table 7)	0.0%	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378	$40,378
User Charge Analysis Services	5.0%	$0	$6,862	$0	$0	$7,565	$0	$0	$8,341	$0	$0	$9,196	$0
Total CIP-related Payouts	N.A.	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5	Table 5
Total Operating Costs		**$699,703**	**$727,556**	**$782,692**	**$804,962**	**$835,465**	**$851,525**	**$875,860**	**$909,265**	**$926,740**	**$953,331**	**$989,916**	**$1,008,930**
Net Income (or Loss)		$26,239	-$14,144	-$75,657	-$43,370	-$12,876	$37,399	$61,496	$79,575	$116,070	$146,463	$170,182	$214,886
Working Capital Goal: 50%	In Dollars, That is:	$349,851	$363,778	$391,346	$402,481	$417,732	$425,763	$437,930	$454,632	$463,370	$476,666	$494,958	$504,465

Notes: Operating costs for each system came from the engineering reports written a decade ago, and have been increased to the present by a two percent annual inflation factor.

Table 17 - Financial Capacity Indicators and Reserves

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-10, Low Staffing, Keep Subsidies

This table depicts the affordability of future rates, the financial health of the system and the ending balances in various (assumed) accounts for the test year and the next 10 years.

Capacity Indicators	Test Year Starting 1/1/18	0 Year Starting 1/1/19	1st Year Starting 1/1/20	2nd Year Starting 1/1/21	3rd Year Starting 1/1/22	4th Year Starting 1/1/23	5th Year Starting 1/1/24	6th Year Starting 1/1/25	7th Year Starting 1/1/26	8th Year Starting 1/1/27	9th Year Starting 1/1/28	10th Year Starting 1/1/29
Customary Affordability Index: Monthly Bill for a 5,000 gal per Month Residential Customer	$20.00	$17.34	$17.34	$18.21	$19.12	$20.08	$21.08	$22.13	$23.24	$24.40	$25.62	$26.91
AMHI Within Service Area	$49,453	$50,327	$51,217	$52,122	$53,043	$53,981	$54,935	$55,906	$56,894	$57,900	$58,923	$59,964
Affordability Index: Current Rates First Column, Modeled Rates After That	0.49%	0.41%	0.41%	0.42%	0.43%	0.45%	0.46%	0.48%	0.49%	0.51%	0.52%	0.54%
Affordability Index (AI) goes to the willingness and ability of customers to pay. AI is the cost of 60,000 gallons of residential service per year (5,000 gallons per month) divided by the Annual Median Household Income (AMHI) in the service area (gleaned from Census data or a survey). Rates near 1.0% are common in the U.S. and are generally considered affordable. Most grant agencies will not consider awarding grants if this indicator is less than 1.5 to 2.0%.												
Low-income, Low-volume Affordability Index: Monthly Bill for a 2,000 gal per Month Residential Customer	$20.00	$17.34	$17.34	$18.21	$19.12	$20.08	$21.08	$22.13	$23.24	$24.40	$25.62	$26.91
Income at One-half the AMHI and Rising at One-half the Rate Above	$24,726	$24,945	$25,165	$25,388	$25,612	$25,839	$26,067	$26,297	$26,530	$26,764	$27,001	$27,239
Affordability for Low-income, Low-volume: Current Rates First Column, Modeled Rates After That	0.97%	0.83%	0.83%	0.86%	0.90%	0.93%	0.97%	1.01%	1.05%	1.09%	1.14%	1.19%
This additional indicator of affordability assumes a residential customer with income at one-half of the median household income above, that income is growing at one-half the rate of the median household income and the customer uses 2,000 gallons per month. Such a customer is likely either a minimum wage or near-minimum wage worker, or is retired and living only on Social Security benefits. Such customers are more commonly the "slow pays" and "no pays" compared to others.												
Estimated Operating Ratio: Current Rates First Column, Modeled Rates After That	1.04	0.98	0.90	0.95	0.98	1.04	1.07	1.09	1.13	1.15	1.17	1.21
Operating ratio (OR) is a measure of the utility's ability to pay its operating expenses using only current incomes. A 1.0 OR is break even. Below 1.0 indicates operating in the "red." Generally, the OR should be at least 1.15 for large systems, 1.30 or more for medium-sized systems and perhaps as high as 2.0 for small systems. Note: If the utility has or will have reserves (below,) it has more ability to pay its operating costs than the OR implies.												
Estimated Coverage Ratio: Current Rates First Column, Modeled Rates After That	N.A.	N.A.	N.A.	N.A.	N.A.	0.00	0.00	0.00	0.00	0.00	0.00	33.77
Coverage Ratio (CR) goes to the ability of the utility to pay its debt payments out of current incomes. OR applies only to years with debt service. 1.0 is break even. Generally, the CR should be at least 1.25. Note: If the utility has or will have reserves (shown below,) it has more ability to make debt payments than the CR implies.												

Reserves	Balance Ending on 12/31/18	Balance Ending on 12/31/19	Balance Ending on 12/31/20	Balance Ending on 12/31/21	Balance Ending on 12/31/22	Balance Ending on 12/31/23	Balance Ending on 12/31/24	Balance Ending on 12/31/25	Balance Ending on 12/31/26	Balance Ending on 12/31/27	Balance Ending on 12/31/28	Balance Ending on 12/31/29
Cash and Cash Equivalents	$26,239	$12,096	-$63,562	-$106,932	-$119,807	-$82,408	-$20,912	$58,663	$174,733	$321,197	$491,379	$504,465
Other Liquid Assets	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Undedicated Cash Assets	$26,239	$12,096	-$63,562	-$106,932	-$119,807	-$82,408	-$20,912	$58,663	$174,733	$321,197	$491,379	$504,465
Total Cash Assets Discounted for Inflation (Future Unrestricted Purchasing Power)	$26,239	$12,096	-$65,528	-$113,648	-$131,271	-$93,086	-$24,352	$48,865	$141,182	$251,736	$373,562	$383,510
Repair & Replacement	-$26,239	-$13,412	-$1,139	$10,544	$21,601	$31,992	$41,679	$50,620	$58,772	$66,089	$72,526	$78,034
Debt and CIP Reserves	$0	$0	$0	$0	$0	-$5,975	-$12,070	-$18,287	-$24,628	-$31,096	-$37,694	$157,377
Sum of All Reserves	$0	-$1,316	-$64,701	-$96,388	-$98,207	-$56,391	$8,697	$90,996	$208,877	$356,190	$526,211	$739,875

Table 18 - Bills Before and After Rate Adjustments

Northern Arapaho Water and Sewer Department; Water Rates, Scenario 2019-10, Low Staffing, Keep Subsidies

Overall effective rate increase	5.1%

The revenue increase above includes meter size-based minimum charges calculated in Table 15, to be assessed to commercial customers only.

This table shows residential customer flat rates, which accounts for nearly all customers.

Customer, Rate Class or Meter Size	Current Bill	Modeled Bill	Modeled Bill Increase or Decrease (-)
Residential Customer	$20.00	$17.34	-$2.66

Chart 1 - Operating Ratio

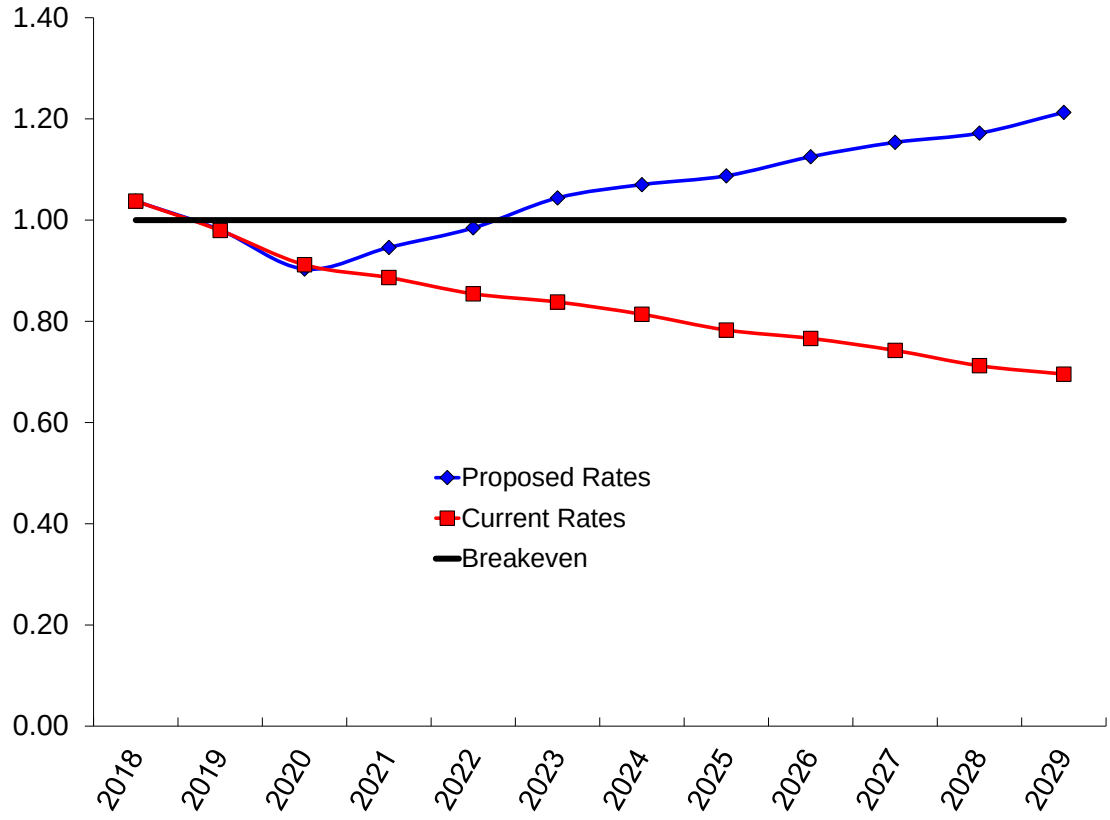

Chart 2 - Coverage Ratio

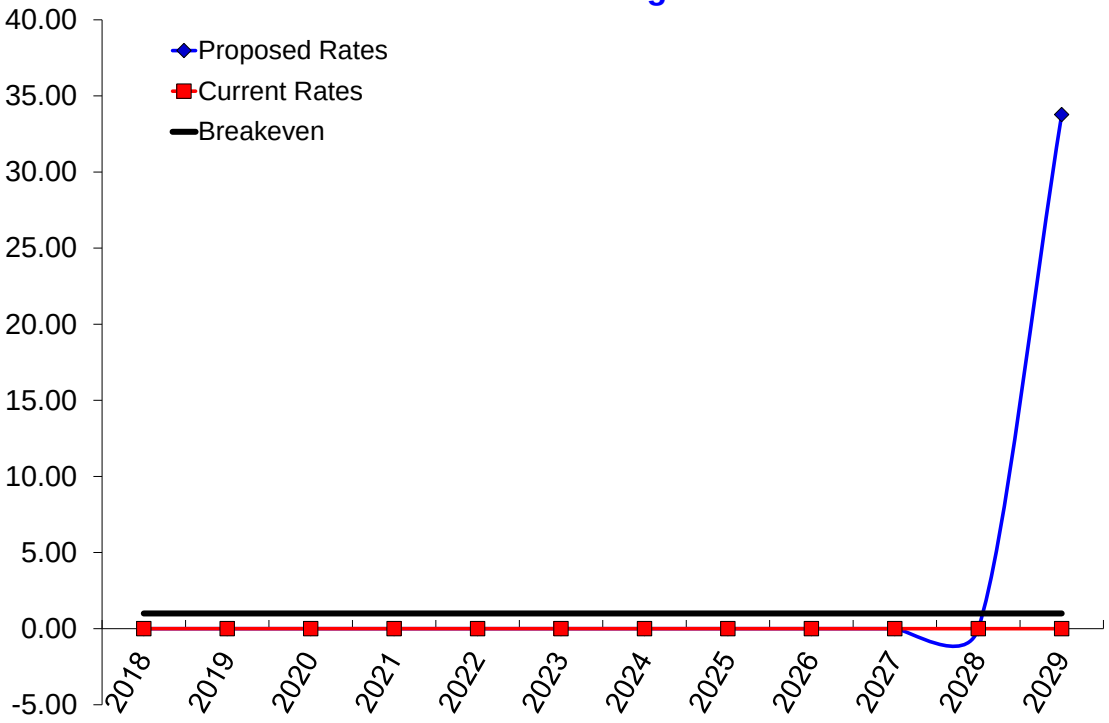

Chart 3 - Residential Users' Bills

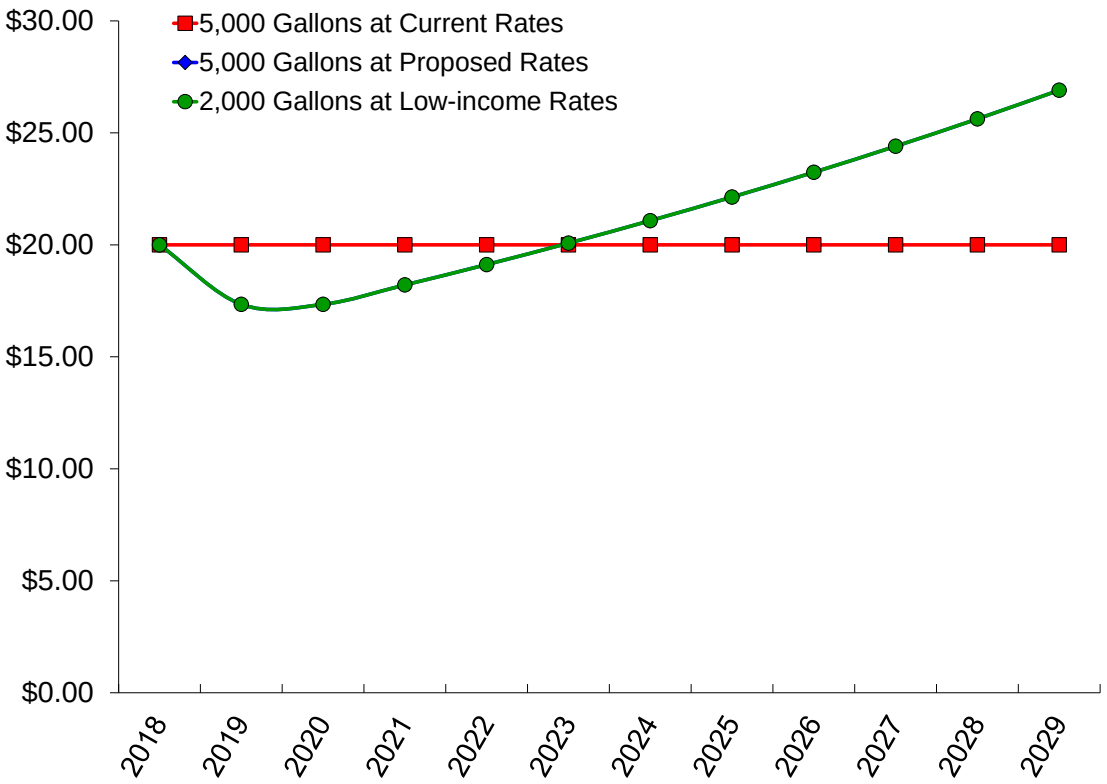

Chart 4 - Affordability

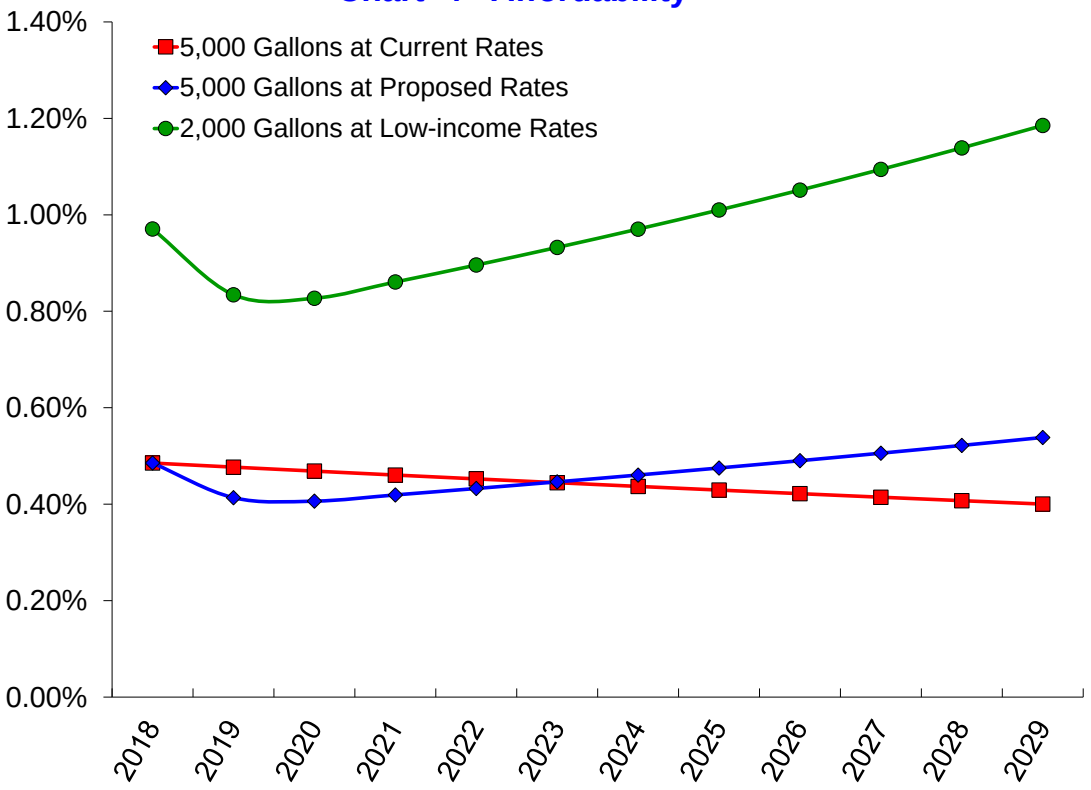

Chart 5 - Working Capital vs Goal

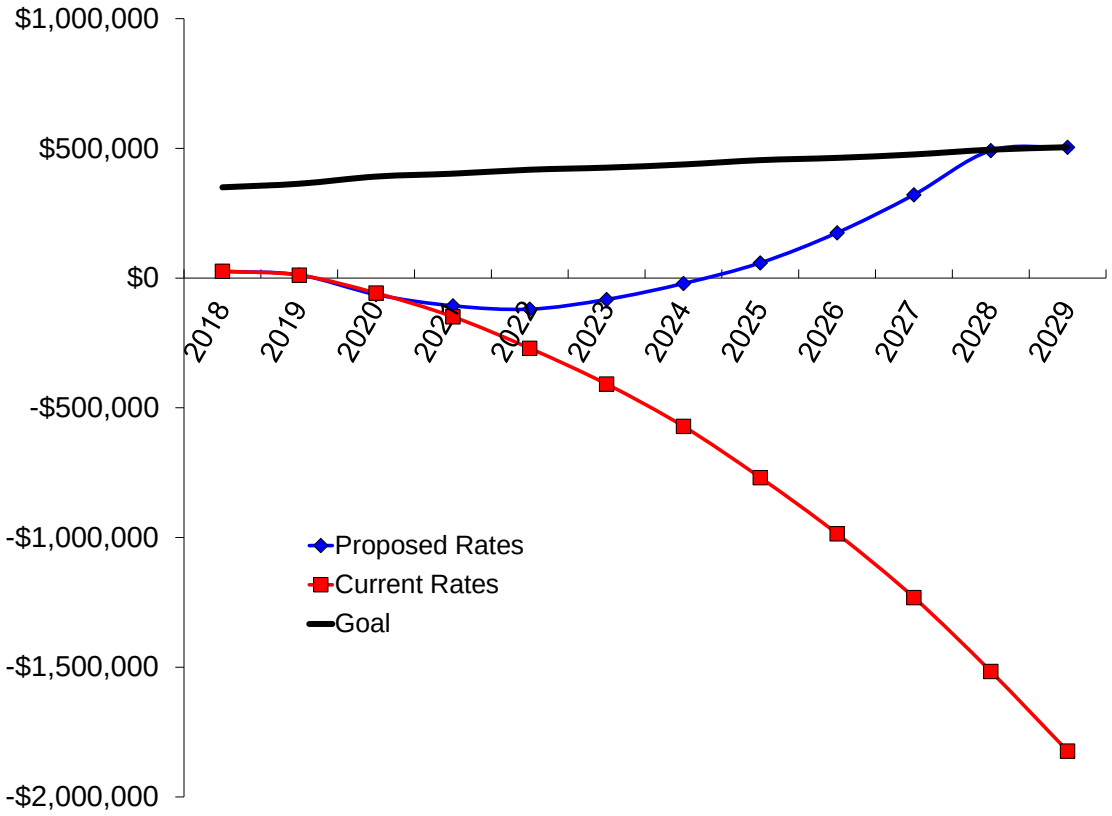

Chart 6 - Value of Cash Assets Before Inflation

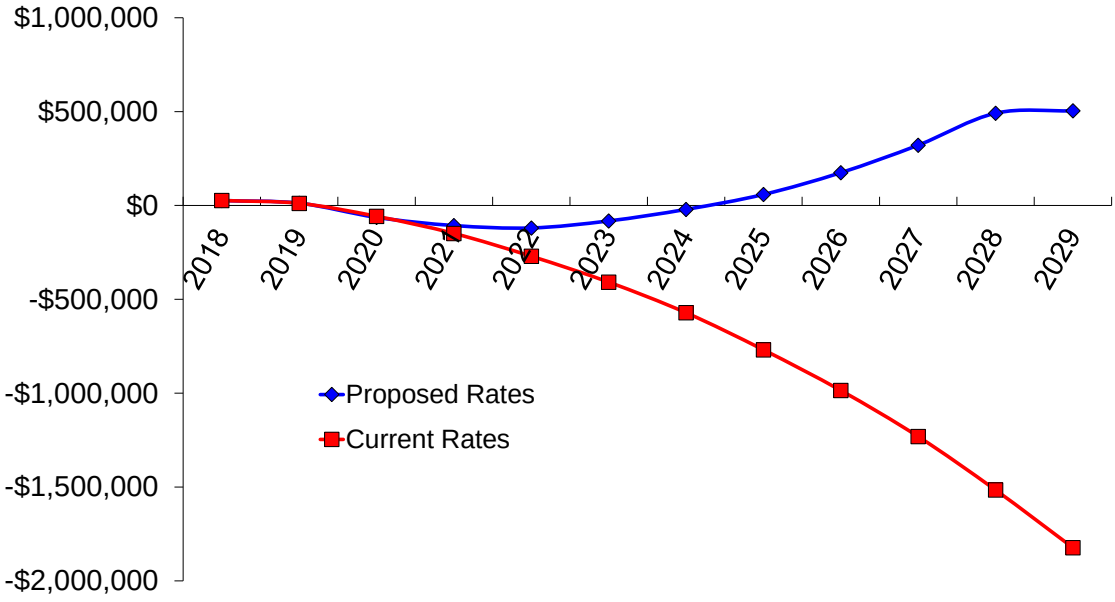

Chart 7 - Value of Cash Assets After Inflation

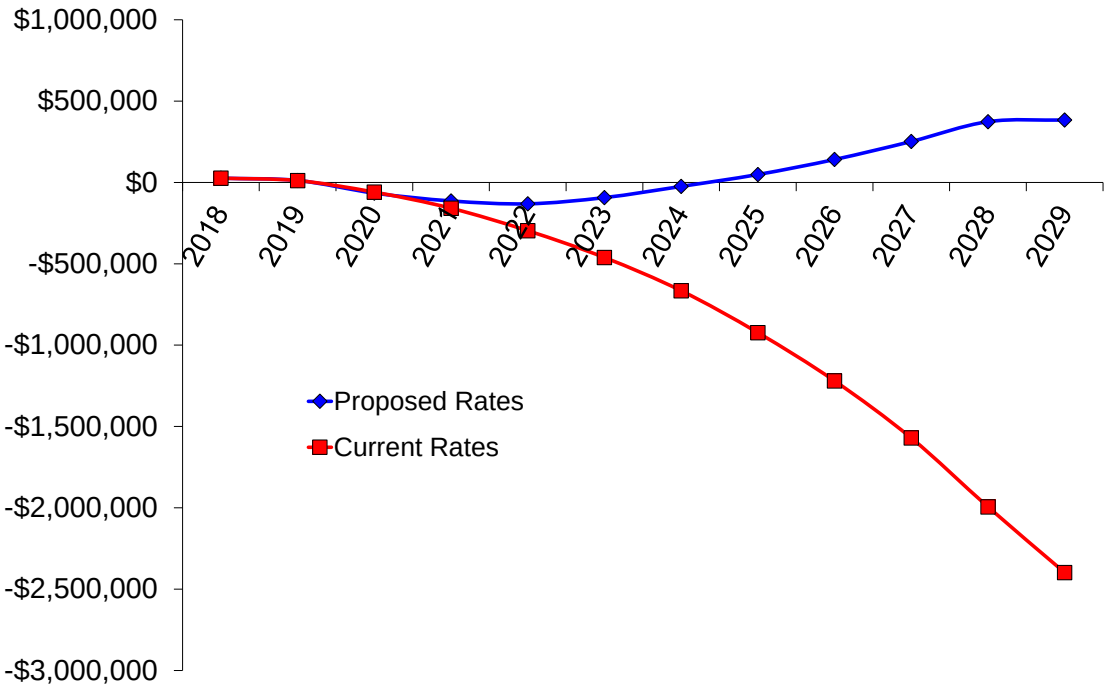

Chart 8 - Sum of All Reserves