DINOSAUR, COLORADO

Feasibility Study on the creation of a Natural Gas Utility to serve the Town of Dinosaur and community.

October 2020

Conducted by:

PINEDALE
Natural Gas

Dinosaur Natural Gas

Feasibility Study

This study explores the technical and financial feasibility of building a natural gas utility to serve the community of Dinosaur, Colorado. This report is structured as a PER or Preliminary Engineering Report in the outline of USDA RUS Bulletin 1780-2 for prospective funding as a USDA Rural Development project.

October 2020 - Final

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EXECUTIVE SUMMARY

Project Purpose and Need for Engineering Study

The town of Dinosaur is located on US Highway 40 just south of Dinosaur National Monument within Moffat County, Colorado.

Currently, the residents and businesses in Dinosaur utilize propane, electricity, or firewood as a heat source. The relatively high price of propane and electricity compared to natural gas and the highly variable price of propane have caused a financial burden on many families. Additionally, the lack of natural gas poses additional costs on existing businesses and community facilities and presents a significant obstacle to attracting new commerce or residents. The lack of natural gas hinders economic progress in Dinosaur.

In 2019, the Dinosaur City Council received a grant to research ways to bring natural gas to the small community. This is not the first-time natural gas has been considered but may be the most realistic and best funded attempt. The grant from Colorado Dept. of Local Affairs (DOLA) funded a Preliminary Engineering Review (PER) to evaluate the feasibility of a municipal gas utility. The outline of a standard USDA PER is attached as Exhibit 1.

Three pipeline route alternatives were evaluated to bring natural gas to Dinosaur. The study works through the potential market, environmental impacts, design, and capacity with estimated cost, and permitting requirements for a gas utility system.

The project would make natural gas available to more than 170 homes, municipal and county facilities, library and welcome center and local businesses within the town, as well as nearby residences and facilities for the National Park Service. It is estimated that switching to natural gas would save the residents of Dinosaur more than $100,000 each year.

Operation and Maintenance (O&M) requirements for a gas utility have been evaluated. The Town of Rangely operates its municipal gas utility and is interested in assisting Dinosaur with the gas-specific field tasks.

The Study includes a public involvement process that included surveys of energy usage and a public meeting.

A financial model was developed to determine the feasibility of the project. By analyzing potential conversion rates based on similar projects, the Study gives guidance on a path to building a gas utility and make it self-sustaining.

1.0 PROJECT IDENTIFICATION

1.1 Project Description and Location

The Town of Dinosaur, Colorado is a village of about 200 structures, located on US Highway 40 near the border with Utah. It was incorporated as the town of Baxter Springs, then renamed Artesia in the oil boom of the 1940s. The current name was adopted in 1966, to capitalize on the town's proximity to the expanded Dinosaur National Monument. The main access point to the Monument is just outside of town, including most access to the Green and Yampa Rivers.

The residents and businesses in Dinosaur currently utilize propane, electricity, and wood as a heat source. Natural gas is not available, although most homes and commerce in the region have access to natural gas supplied by a utility. Census data show that 69% of all homes in Colorado are heated with gas, and 82% of all homes in Utah.

The relatively high price of propane and electricity compared to natural gas and the highly variable price of propane has caused a financial burden on many families, businesses, and community facilities in Dinosaur.

This Preliminary Engineering Report examines the feasibility of building a natural gas utility in the community.

1.2 Project History

In 1956, Northwest Pipeline Company (NWPL) built a 1500-mile pipeline to the Pacific Northwest from the gas fields in the Four Corners area. The original 26-inch steel pipeline went through or near Moab, UT and Grand Junction, CO; to Vernal UT and Green River, WY; then on to serve Boise, Portland and Seattle and many points in between.

The original NWPL mainline passed only 4 miles southwest of Dinosaur. Over those six decades, several oil & gas drilling booms have developed in the region. Thousands of wells were drilled in the last decade in the Uintah Basin, and their gas mostly transported by NWPL, but the town never got natural gas service.

Nearby towns in Utah including Vernal were served for decades by Mountain Fuel (now Dominion Questar). The nearest Colorado town of Rangely built its own municipal gas system. Other regional Colorado towns have been served for many decades by Public

Service (now Xcel) in Grand Junction-Meeker-Rifle, and Greeley Gas (now Atmos) in Craig and Steamboat Springs.

The Town has contacted NWPL (now part of the Williams Companies) and various producers and utility developers over the years, but had limited resources and no corporate sponsor; and still 64 years later, the Town of Dinosaur has no natural gas.

In late 2019, the Town, working with USDA Rural Development, received a grant from the Colorado Department of Local Affairs (DOLA) to perform a research and design study (the Study) to research and plan for the feasibility of providing natural gas to the Dinosaur community. The grant proposal identified several issues to be addressed as part of the Study, including:

- Identify potential gas customers: active water meters in Town, outlying buildings within extension distance, structures and homes at Dinosaur National Monument and National Park Service or NPS center, and all active buildings in between;
- Characterize these users for current heating source: propane tank, all-electric, large wood pile; assign load estimates to each customer; estimate total BTU load;
- Research existing heating fuels & prices; conversion rates;
- Lay out potential routes for the supply pipeline from NWPL; check BLM vs private ownership; provide rough design for regulator station & odorizer & telemetry;
- Design the town piping system; reg station, meter count, service lines, conditions for construction, impact on roads & utilities; specify material-model-mfr-size;
- All design & layout will be done in ESRI ArcGIS for easy mapping and eventually, for long-term database & DOT recordkeeping;
- Cost estimate of the pipeline systems and startup costs;
- NWPL contact and update cost estimate; evaluate alternatives; FERC issues;
- Create economic model and proforma financial analysis;
- Compare resulting natural gas rates with existing fuel costs;
- Long-term comparisons of natural gas vs propane prices, discuss sensitivities;
- Regulatory issues: discuss DOT regulations and all required pipeline safety programs (O&M, EP, OQ, DIMP, PA etc.); CPUC jurisdiction & interaction;
- Review available Town personnel, resources & processes to run this utility;
- Wrap all findings into a comprehensive report with maps, tables, exhibits; with recommendations based on comparison with similar small gas utilities.

1.3 Physical and Environmental Attributes of the Project Area

1.3.1 Geology and Soils

The project area is in Moffat, Rio Blanco and Uintah Counties within northwestern Colorado and eastern Utah. Figure 1.1 shows a general location map of the project area, which encompasses Dinosaur as well as the various supply pipeline alternatives.

This project area lies within the Uintah Basin along the Green River. The soils are defined geologically as Quaternary period alluvium, undivided with clay, silt, sand, gravel, and some caliche. Gravel includes sedimentary and igneous rock clasts. These would have been transported and deposited from glacial recession of the continental ice sheet directly or melting causing alluvial floodplain deposits. More recently soils would be more likely transported and deposited by wind from the surrounding desert or mountainous areas. These events occurred in the Quaternary period (2.6 million years to present day; modern geology) including the Pleistocene and Holocene epochs.

These soils are called fluvisols that are characteristically deep and well drained to excessively well drained. The topsoil and subsoil layers are primarily loam with mixtures and variations of silt, sand, gravel, and clay. These soils are moderately erodible with an erodibility range between 0.20 to 0.39 (on a scale from 0 to 0.64, higher values being more erodible). These soils generally have a pH of 8.0 and are carbonate-rich with a very low electric conductivity. These soils have a moderate to high steel corrosion risk making them more suitable for Polyethylene (PE) pipe.

These soils overlay mostly sedimentary rock composed of sandstone and shales. The sandstones are from the Mesa Verde group from the Upper Cretaceous period. The shales are of the Mancos group from the Upper Cretaceous period. The latter would make up any shallow or exposed bedrock sections that would occur in the project area.

The soil characteristics in the area along the project route chosen should be ideal for plowing or trenching PE gas pipe at the desired depth. Though shallow bedrock exists in short sections of the project, there should be sufficient topsoil for construction. Though interaction with bedrock should be minimal, a rock saw should be available on standby.

1.3.2 Floodplain

The project is in the upper portions of the Cliff Creek and Dripping Rock Creek drainage basins. Water flowing to the northwest eventually runs into Cliff Creek that flows into the Green River near Jensen, Utah. To the southeast of the project, water flows into Dripping Rock Creek and eventually into the White River about 12 miles west of Rangely. The White River is tributary to the Green River entering just south of Ouray, Utah. The Green River originates in Wyoming and is a major contributor of the lower Colorado River.

Both upper watersheds in the project area consist of intermittent dry wash streams that may only fill with water seasonally or following short weather events. None of the natural waterways in the direct vicinity of the project hold water year-round.

1.3.3 Surface Water

There is very little natural surface water in this area. Surface water in intermittent streams and low areas may only be seasonal following local weather events or snowmelt. In the surrounding rangeland there are half a dozen very small, diked ponds that may be in use seasonally for livestock but are very often dry. The Town of Dinosaur maintains two wastewater evaporation ponds southeast of town.

With well-drained but compact soils and surface bedrock common in the surrounding area, flash flooding and overland flow is a common occurrence following precipitation events. This occurs when the precipitation rate exceeds the rate of water infiltration in the soil or in areas with shallow or exposed bedrock. These however are very seasonal and specific events do not often last very long. Such events have been known to bury above-ground water and sewer valves and manholes located in low unpaved areas in the Town of Dinosaur. This will be considered when designing and installing the natural gas distribution valves for the system. The gas pipelines will be at least 30” deep and should be unaffected by flooding events.

1.3.4 Groundwater

The Colorado Plateau aquifers underlie an area of approximately 110,000 square miles in western Colorado, northwestern New Mexico, northeastern Arizona, and eastern Utah. The distribution of aquifers in the Colorado Plateau is controlled in part by the structural deformation and erosion that has occurred since deposition of the sediments that

compose the aquifers. In general, the aquifers in the Colorado Plateau area are composed of permeable, moderately to well-consolidated sedimentary rocks.

More specifically the Colorado Plateau Aquifers in the project area include the Uintah-Animas (South), Mesa Verde (Central), and the Dakota-Glen Canyon (North) aquifer systems. Underlying these are various confining units that are made up of relatively impermeable rock separating aquifer systems.

These are moderately to poorly recharged aquifers, usually recharged at higher altitude where there is greater precipitation and more permeability at the margins of each basin. Recharge would be more likely in the alluvium and sandstone layers, but not in the Mancos shale layers. Ground water is discharged mainly to streams, springs, and by transpiration from vegetation growing along stream valleys. Ground water would generally flow toward discharge areas of the Green River and White River depending on the watershed.

Water depths range from ground surface to 1000 ft below the surface. In the project area, there are not any apparent aquifer recharge or ground water collection areas that would affect construction of gas pipelines at the desired depth. There is a very low probability of interacting with an aquifer in construction of this project.

**Ground water data sourced from the GROUND WATER ATLAS of the UNITED STATES: Arizona, Colorado, New Mexico, Utah HA 730-C*

1.3.5 Biological Environment

The biological environment around Dinosaur can be classified as high desert steppe, and nearly entirely used as grazing rangeland. Most of the ecosystem in the project area outside of town is made up of sagebrush and saltbush with various grasses and desert wildflowers as well as scattered areas of pinyon-juniper shrub and forest land. Perennial plants (sage, shrubs, and trees) in the area are very hearty and can survive with minimal water. Most other plants (forbs, grasses) in this type of ecosystem are annuals or biennials and occur seasonally, with some perennial bunch grasses. Plants are often spread out, leaving exposed ground in areas. This along with sparse tree cover in most areas causes some pros and cons. The soil is exposed to wind from all directions. The wind can deposit finer soils (loam, sand, silt), or the wind “taketh away”, causing a strangely sporadic nutrient cycle.

Ecosystems like this that are managed as rangeland with livestock and localized oil worker activity are very susceptible to invasive species. Along most disturbed areas are all sorts of plants brought in from many years of activity. These can include Russian thistle, sunflowers, cheat grass, sweet clover, and other invasive species. These are not necessarily inherently bad for the ecosystem but can often outcompete the native forbs and grasses as many invasive species are very hearty and adaptive. This can permanently change the ecosystem and a trend towards new invasive species may decrease habitat for the native wildlife.

Ecosystems in town or around houses are more likely to have larger tree species like cottonwoods and possibly spruce as well as grassy lawns and ornamental species. There is usually an abundance of invasive species in occupied areas, with more water due to infrastructure. The species diversity will be reflected as desert species that may occur in wetter areas (native or invasive). This creates a kind of man-made oasis affect.

High desert steppe can also contain added biology in the soil in the forms of long-living crypto-biotic colonies. These thrive in low precipitation off the beaten path in undisturbed areas. They are unlikely to occur in the project route.

The pipeline alignments are designed to be entirely in previously disturbed areas, in or along BLM roads and trails, and in public rights of way in the Town of Dinosaur and along state highways. Most of the pipe in the rangeland will be plowed into place, causing minimal disturbance to root structures and plants compared to trenching techniques. Most trenched construction will be in roads where there is little existing vegetation.

1.3.6 Wildlife and Habitat

The project is in historically disturbed areas (roads and public ways) and is not classified as special habitat for wildlife.

The surrounding high desert steppe and pinyon-pine ecosystems would be habitat for many species native to Northwestern Colorado. This includes elk, mule deer, pronghorn antelope, coyotes, rabbits, prairie dogs, lizards, various insects, songbirds, raptors, various rodents, possibly snakes, as well as various game birds. Dinosaur is in the GMU #10 hunting unit which boasts having the largest elk population in Colorado. During the

months most conducive to construction, most elk stay at the higher elevations away from town.

The surrounding area is mostly managed rangeland and could have cattle, goats, and other livestock grazing in areas. Northwestern Colorado has a population of wild horses with a very large range that could sporadically move through the area.

Some of the surrounding area near the project may be classified as Sage Grouse habitat which would require construction to be timed for specific times of year outside of the species mating and nesting seasons. This would require insight and regulation from the BLM that would be addressed through the SF-299 application process.

The construction period near any habitat would be less than a week in any one spot and would minimize any habitat disturbance from noise, spatial occupation, or ground disturbance. This project will not pose any significant disturbance to wildlife.

1.3.7 Wetlands

There are no designated wetlands along the route of the project. All streams and managed rangeland ponds are intermittent and seasonal. See Section 1.3.3 on Surface Water for more detail.

1.3.8 Historic and Cultural Resources

The area around Dinosaur, CO has a long and rich cultural history. Pictographs and petroglyphs made by historic peoples have been found in many areas nearby including Dinosaur National Monument north of town. The current estimation is that people have been living in this area for around 10,000 years.

The Fremont people were thought to live in this area around 800-1200 years ago. They were thought to be the primary creators of the rock art in the area and have left many traces of historical value. They were the forerunners of more modern tribes such as the Ute and Shoshone that still live in the area today.

In the 1700s, Spanish explorers made expeditions into the region looking for routes to California and claiming land for Spain, Mexico, and God. The route through Northern

Colorado was not often used after the initial expeditions until trappers and later American settlers started exploring the area.

Homesteaders and settlers came out in the mid to late 1800s likely veering off from the main route of the Oregon, California, and Mormon trails or straggling up through the mountains of Colorado looking for beaver and gold. The lucky settlers that had access to water stayed and some have descendants in the area today.

The paleontological record found in Dinosaur National Monument is one of the more impressive finds of Dinosaur fossils found in history. The historical significance of the area has been very important in the understanding of the world's cultural and scientific records and that of the Western US. The resources in this area has most likely caused the rewriting of history multiple times.

The project route will be constructed in existing roads and public ways and will not be near any of any identified valuable cultural sites. The BLM will assess the area further in the SF-299 application process. No disturbance of any historic cultural resource is anticipated in this project.

1.3.9 Overall Environmental Impacts

Environmental Impacts from construction of the system will be negligible.

The 5-mile line from NWPL runs entirely down an existing 2-track trail on BLM land. Because there are no underground utilities or difficult soil conditions, this line can be entirely plowed into place. Since the plow does not remove all deep-rooted plants, reseeding and other rehab are not needed.

The small-diameter PE pipe mains can be installed in trenched ditches generally 6-8" wide with 24-30" of cover, and 18" for service lines. Most of these trenches are in existing Town alleys and along the sides of streets, with little curb & gutter or pavement disturbance. The disturbed soils will not need much rehabilitation for mains in Town corridors, and rehab of each service in the yards will be up to the individual customers.

Any crossings of paved streets, US 40 and others that could potentially disturb pavement, traffic, commerce, or other valuable assets can be directionally bored.

There are no stream or wetlands crossings in the entire project. There are no chemicals used in the construction process. There are no significant emissions other than typical excavators, trenchers, trucks, and other construction equipment. There is a minimal amount of natural gas released in the pressure testing and startup process, which is very sporadic and limited.

In short, the proposed project will have minimal negative environmental impact during construction. The larger environmental impact will be positive, as natural gas displaces propane, solid fuels and electricity generated by coal or gas, all of which have significantly more emissions and carbon footprint than natural gas heating.

1.4 Population and Growth Trends

Latest population estimates from the U.S. Census Bureau (USCB 2018) indicated that the 2018 population of Dinosaur was approximately 278. This is down from an estimated peak population of 339 in 2010. The 2018 Census estimate had 112 occupied houses in town plus 15 counted outside of the town limits including the NPS housing. This is down from an estimated 211 occupied units in 2010.

Census data can be flawed with numbers lower than reality, due to missing data on citizens that do not participate. We believe this may be the case for the 2018 Census estimate. Our GIS survey of the town came up with a larger number of approximately 180 occupied structures including 150 residences.

The population of Dinosaur has been mostly stable over the years, with a slight declining trend since 2010. Growth is not expected or projected for the Dinosaur community. Any new gas utility project will have to stand on current parameters of size, occupancy, and heating fuel.

2.0 PROJECT NEEDS

2.1 Public Involvement

Public involvement and communication are crucial components of any community planning process or feasibility study. Success hinges upon mass engagement of the public. The Town staff of Dinosaur facilitated a public involvement process for the Study. This process involved a public meeting, newspaper and web-based notifications, informational posting at the post office, and print based surveys sent out with the water bills including data & opinion collection.

2.1.1 Public Meetings

Following a month-long advertising campaign utilizing flyers, mailings, Facebook, and local paper notifications, one public meeting was held at 6:00 PM September 8th, 2020 at Town Hall.

Many aspects of the project were discussed in this meeting: project design, pipeline alignment, NWPL delivery station & tap fee, construction, GIS mapping & database, estimated cost, economics, needs from the community, cost to customers, project viability, operations of a completed system, the future of natural gas in the energy market, and the funding of the project. An optional project could be the public financing of new water heaters as an incentive for new customers. Rangely Gas was discussed as the most viable solution for the higher-level operating tasks that would be required of the utility. The highly circulated rumor of high gas prices in Rangely was addressed and largely put to rest.

The public meeting was scheduled to be outside in the park for CoVid social distancing reasons. The advertised event happened to coincide with a freakishly early winter storm day with cold temperatures, heavy winds, and rain and snow. The meeting was moved to Town Hall, with about 20 attendees including several town council and staff and citizens. The participants were very receptive and had many good questions that were answered thoroughly. All issues seemed to be addressed and everyone was in good spirits and in support of the project at the end of the meeting.

Going forward, the consultants asked that staff would collect propane usage for any residents or entities willing to share information. Further information would be sent out

with the town water bills to inform the public and possibly collect more usage information from potential customers.

2.2 Identified Project Benefits

Dinosaur is located near the Utah border on US 40 from Denver, through Steamboat Springs and Vernal to Salt Lake City. The Town furnishes water and wastewater service to all addresses in town or directly adjacent to town. There is no public system to deliver energy such as natural gas.

Although Northwest Pipeline went by in 1956, no entity stepped up to extend natural gas service to Dinosaur. The 2010 US Census data show a mix of Home Heating Fuel in Dinosaur that is typical of a high altitude, cold climate Western community that does not have natural gas:

- 47% on bottled propane
- 21% on electric heat
- 32% on all other fuels, most likely wood-pellet-coal stoves
- 0% had No Fuel Used, which would include solar heat

The last 32% are primarily on solid fuels, as declared on the Census form. It is widely known that many of the propane and electric heating systems are also supplemented with solid fuels.

The study did not include energy audits of actual structures, to review energy saving practices like insulation, windows and sealing, or the age and efficiency of the primary heating unit. These are useful for individual residents but not practical for a wider study.

To estimate typical heating loads, we analyzed usage records for gas customers in similar climates. Pinedale Natural Gas or PNG operates the utilities in Pinedale, WY and Walden, CO, where PNG operates the Town of Walden municipal gas utility. For determination of an average Residential customer, we used history from similar conditions of altitude, climate, and size & age of structure. We also used actual usage history of some residential propane users in Dinosaur. We gathered actual usage history for several larger users such as Town Hall, the Library, the Moffat County roads shop, and others.

Comparisons were made of heating costs for a typical residence on natural gas, electricity, and propane. Wholesale natural gas and propane prices are based on decades of records by Pinedale Natural Gas and a related propane company.

The average annual savings of a typical home heated by propane that switches to natural gas would be about $700 per year. A typical all-electric household would save about $200 per year.

At least $100,000 annually would stay in the pockets of local residents if there was widespread conversion to natural gas. The project savings would not only benefit the residents of the Dinosaur community but would have a positive economic effect that would ripple through Moffat County and surrounding area.

There are other significant benefits to service from a natural gas utility. Compared with bottled propane used by 47% of Dinosaur homes, natural gas from a utility system is always available, doesn't run out in late winter when prices are high and the bottle is low; and is not curtailed when supply shortages hit the region.

Compared with solid fuels used by another 32% of Dinosaur, natural gas burns far cleaner with near-zero smell or soot or outside exhaust. There is not a late-fall scramble to cut firewood, nor the constant attention to refueling the stove.

Aging Infrastructure is not a significant issue on this project since there is no utility gas system now in use. But with about 2/3 of all structures built before 1980, any original home heating system has low energy efficiency in the 50-65% range. This compares with 90%-plus efficiencies for systems from the mid-1980s forward. Natural gas conversions should greatly increase energy efficiency. The same advance will apply to most solid fuel appliances.

3.0 POTENTIAL SERVICE AREA AND NUMBER OF ANTICIPATED CONNECTIONS

Natural gas utility projects must be built on strong economic justification. Every occupied structure must have water, electricity, and communications lines, but natural gas is not an absolute necessity. For several decades, utility gas has been significantly cheaper than heat from propane, heating oil and especially electric heat. In addition to the savings in heating costs, health and security are usually improved with natural gas conversion.

A major contributing factor to the success of this project will be the conversion rate of existing heating systems to natural gas. If only a limited number of residences and businesses convert, the price of gas charged to those customers would be relatively high, thus making conversion unattractive. In contrast, if a large percentage of the residences and businesses convert to natural gas, the rates would be significantly lower and would make conversion from propane or electricity more attractive.

3.1 Dinosaur

The Town of Dinosaur is a very rural village of about 200 structures, located on US Highway 40 in Moffat County, Colorado near the border with Utah. The nearest communities are Rangely, CO about 18 miles southeast; Vernal, UT 38 miles west, and the county seat Craig, CO at 88 miles east.

According to 2018 Census estimates, Dinosaur has 112 occupied households within its town limits and has a total population of 278 (USCB 2018). There are 15 occupied households including the NPS facilities outside the town limits. We have adjusted the Census numbers based on actual counts and believe there are 150 occupied households in the surrounding area. Refer to Section 1.4 for more detail.

Dinosaur has several public and community buildings: Town Hall, the US Post Office, the US 40 Welcome Center, Moffat County Library and the road & bridge maintenance shop that also hosts the medical Clinic; and Artesia Fire Dept. has several buildings. The Town has committed to convert to all its heating loads to natural gas when available. The Dinosaur school closed in 2014 and is in the process of being remodeled and converted to a community center.

Dinosaur hosts a variety of businesses including restaurants, motels, gas station-convenience stores, a church, trucking company, liquor store and marijuana dispensaries that could all benefit from natural gas service.

All of these are potential commercial gas customer that would anchor the gas utility. The project as evaluated would extend gas utility mains along streets and alleys to serve every address in the Town of Dinosaur.

3.2 Outlying Areas

In addition to the base project serving the town, the PER study includes a short extension of gas mains to the east along US 40 to the National Park Service (NPS) complex at the entrance to Dinosaur National Monument at Harpers Corner Road.

This extension would serve a dozen residences and ranches along with some NPS facilities. The NPS compound includes a welcome center at the entrance, adjoining Park offices, a large maintenance shop, a smaller shop and yard. Up the Park road northwest and hidden from public traffic are 8 employee houses and a seasonal employee 6-plex dormitory.

The community of Blue Mesa with a dozen homes is 6 miles east from the NPS facilities. To the west of town 0.6 miles are some ranch buildings and an old store at Sand Spring Wash. These were not included in the study project due to long extensions that would not likely be justified. These are best evaluated when the utility is up and running.

3.3 Number of Anticipated Connections

The Dinosaur utility can only be successful with a high conversion rate for propane users, and a modest conversion of electric heat. The base project includes gas mains serving the entire area. The base project also includes the cost of the service line to the building wall of each customer, to reduce the cost of connection and increase the rate of conversion.

3.3.1 Residential

In and around the Town of Dinosaur are approximately 150 occupied residential units. The project appears to be feasible if 100-120 homes convert within the first 2 years after construction.

3.3.2 Commercial & Government

In and around the Town are approximately 25 occupied commercial structures. Business and government buildings are generally larger with higher annual heating demand and would anchor the utility. The study anticipates that virtually all businesses and government properties would convert to natural gas. The Town is working to convert the old school building to a community center. This would be a significant gas user but was not counted in the study until Year 3.

3.3.3 Outlying Areas

The private residences and ranches along US 40 east of town would generally require longer service lines than homes in town. The project design and cost estimate include a service line up to 200 ft, then likely a modest charge for extra footage. These charges will be evaluated case-by-case when gas service is requested.

The NPS welcome center is usually closed for winter. The center and adjoining offices are heated with 2 large heat pumps that also provide air conditioning. These will not likely be converted.

The smaller 1800 sq ft maintenance shop is heated with propane and can be converted. The larger 10,800 sq ft shop is scheduled for replacement and would likely be heated with propane, so can be converted.

The 8 single-family homes in the NPS employee housing area are heated with propane and would be easy to convert. The 6-plex dormitory is all-electric and generally summer-only, so would not likely convert.

The Park Service expressed its commitment and support in a 2015 letter for an earlier gas proposal. The current facilities superintendent also supports the gas project and provided updated load information, as well as a new 2020 letter of support.

4.0 REGULATORY REQUIREMENTS

This section describes the general permitting requirements associated with construction of a natural gas pipeline from NWPL to Dinosaur and the distribution system in town and nearby. Permits may be required from several federal, state, and local agencies or entities. This section describes the general permitting process and basis for various permits, while Section 7 evaluates permitting considerations for various pipeline alignment alternatives.

4.1 Federal Energy Regulatory Commission (FERC)

The best practical locations for a connection to Northwest Pipeline are both in Utah, while the distribution system is in Colorado. The supply pipeline to Dinosaur would then be, in fact an ***inter***state pipeline.

Most interstate pipelines like NWPL are regulated by FERC. To avoid FERC jurisdiction, Dinosaur will ask FERC to be considered a Hinshaw pipeline, which is a local distribution utility or pipeline served by interstate pipelines that **is not** subject to FERC jurisdiction. This is a very important distinction, to be regulated at the state level as an ***intra***state pipeline. FERC pipelines are governed at the federal level, which brings many more regulatory and compliance requirements that would be daunting for a small distribution utility.

Hinshaw exemptions are granted to gas distribution companies that cross state borders, since they are already regulated by the States in which they operate. A good regional example is Mountain Fuel (Questar-Dominion), that gathers gas in Wyoming and serves Rock Springs and other towns, but also transports gas to serve the Salt Lake – Wasatch area. This is a Hinshaw pipeline in Wyoming and Utah, but it cannot move gas around FERC into Nevada.

4.1.1 Filing a FERC Determination

Section 7(f) of the Natural Gas Act, 15 U.S.C. §717f(f), provides for the determination of a service area so that a gas utility such as Dinosaur may supply local distribution markets across state lines without further FERC authorization.

For a Utah connection, Dinosaur would ask FERC for a "7F Determination" that the Dinosaur gas system may exist in Utah and Colorado, that the supply pipeline may cross

state lines, and that Dinosaur can serve customers in a defined area without FERC regulation.

There are two options to obtain a 7F Determination for the Dinosaur distribution system. Both involve filing the same paperwork and obtaining the same pipeline status.

The obvious option is to hire a FERC attorney. Since there are few FERC specialists outside of Washington DC, and one would professionally create a complete FERC case record, the cost would likely range $25-50,000 for the result.

The second and better option is to mimic other, similar cases. In 2013, Pinedale Natural Gas assisted Walden Gas with a Hinshaw exemption for its transmission and distribution system constructed in Colorado and Wyoming. Using similar previous Hinshaw cases as a basis, Walden's lawyer in Wyoming filed a 7F application with FERC. This process cost under $5,000 and took 6 months but did not require a large FERC case record and was a relatively simple transaction.

4.2 Bureau of Land Management

A pipeline right-of-way grant application (SF-299) will be required to cross federal lands administered by the US BLM. This usually involves a Plan of Development (POD), a Reclamation Plan, as well as application and processing fees. The BLM will assess the project and usually issue a 30-year lease or other agreement if the project is to their standards. A bond may be issued which is usually refundable after a certain time after construction. A municipality can often submit a certificate of insurance in lieu of the bond. NEPA implications are addressed in detail in the previous section. Potential federal land crossings for each alignment alternative are addressed in Section 7.

4.3 U.S. Army Corp of Engineers (USACE)

Under Section 404 of the Clean Water Act (CWA), projects that directly discharge fill or dredge material into Waters of the U.S. require a 404 permit. Waters of the U.S. typically include lakes, streams, wetlands, and certain other water bodies. Wetlands are aquatic features defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar

areas" (33 CFR §328.3(b)). Wetlands subject to the CWA jurisdiction are known as "jurisdictional wetlands," while those wetlands not subject to CWA jurisdiction are known as "non-jurisdictional" wetlands. Isolated waters and wetlands and man-made ditches and channels also may be considered jurisdictional aquatic resources, which must be verified by the USACE. The natural gas pipeline installation would not require any creek crossings or any other potentially jurisdictional aquatic resources and would not require any level of USACE permitting prior to the start of construction.

4.3.1 Design Criteria

Disturbance of Waters of the U.S. should occur only when other alternatives are not feasible. The design of the pipeline should be an avoidance-based, iterative process. Potential jurisdictional aquatic resources should be identified using the National Wetlands Inventory (NWI), aerial imagery, and U.S. Geological Survey (USGS) topographic mapping.

A field investigation has been conducted. There are no wetlands or stream crossings within the area of this project.

4.4 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) requires federal agencies to determine if a proposed action has significant environmental effects and to assess the effects of the proposed action. NEPA procedural requirements are triggered when a federal agency decides on an action, including financing a project or approving a permit application. In this case, NEPA procedures may be triggered by crossing federal lands (including Bureau of Land Management [BLM], National Park Service [NPS], and/or U.S. Forest Service lands) and/or by receiving federal financing such as through the USDA-RD.

If NEPA procedures are triggered, a NEPA analysis must be conducted that considers the affected environment (including such things as threatened and endangered species; historic and cultural resources; and wetlands), potential impacts, and mitigation measures to reduce or avoid impacts. Since there is the potential for the involvement of multiple federal agencies, the agency with the major role in the proposed action may serve as the "joint lead agency." Other federal agencies, if involved, would participate as a "cooperating agency", and could tier off the NEPA analysis to formulate a decision on the proposed action. Depending on the significance of the potential environmental

impacts, the NEPA analysis may result in a categorical exclusion document (CATEX), environmental assessment (EA), or environmental impact statement (EIS). The appropriate level of NEPA analysis would be based on agency/agencies initial analytical evaluations.

4.4.1 Categorical Exclusion (CATEX)

A federal action may be categorically excluded from a detailed environmental analysis if it does not individually or cumulatively have a significant effect on the human environment (EPA 2016). The reason for the exclusion is generally detailed in NEPA procedures adopted by each federal agency. In the event of a CATEX determination, neither an EA nor EIS would be required.

4.4.2 Environmental Assessment (EA)

For situations where a CATEX cannot determine if significant impacts are expected, federal agencies may decide to prepare an EA. An EA will determine whether a federal action has the potential to cause significant environmental effects. Each federal agency has its own NEPA procedures, but generally the EA includes a brief discussion of project need, the proposed action and alternatives, agencies/persons consulted, and the environmental impacts of the proposed action and alternatives.

Based on the EA, the federal agency can determine that the action will have no significant impact and issue a Finding of No Significant Impact (FONSI); or the EA may determine that the environmental impacts of the project are significant and that an Environmental Impact Statement (EIS) must be prepared (EPA 2016).

The principal review agency for the proposed project is the BLM. The proposed pipeline will follow existing, long-term disturbances for 100% of its corridor to town, then the distribution mains will follow public easements for 100% of alignment. This project will be reviewed by BLM and will likely be considered for Categorical Exclusion with no further EA or certainly EIS work.

4.5 National Park Service (NPS)

General support was given for this project from NPS staff. To cross NPS land to serve the 8 houses and NPS center, there will be a permitting and environmental review process like that of the BLM SF-299 application. NPS staff does not believe this to be much of a

hurdle since the project will exist in previously disturbed right-of-way. Since that section of the project will only exist to service the NPS facilities, NPS staff has incentive to make this process move as quickly and easy as practical.

If this project is treated as other similar projects by PNG, the SF-299 processes for BLM and NPS can be combined into a single permit administered by BLM.

4.6 Colorado Public Utilities Commission (CPUC)

The CPUC is responsible for regulating natural gas utilities that provide retail gas service to Colorado customers. The CPUC duties include granting certificates of public convenience and necessity (CPCN) for new utilities and major facilities; reviewing, analyzing and hearing gas utility applications to pass-on wholesale cost increases in the cost of natural gas; reviewing integrated resource plans for large gas utilities; and approving mergers, acquisitions and transactions between companies, among other things. The CPUC also administers compliance with gas pipeline safety regulations under contract with US DOT Pipeline & Hazardous Materials Safety Administration or PHMSA.

The Dinosaur municipal gas system (like that of Rangely and Walden and others) should not require a CPCN to serve gas customers in Colorado. The utility will be subject to the CPUC jurisdiction for compliance with pipeline safety rules at 49CFR Part 192 et al.

4.7 Colorado Department of Transportation (CDOT)

A permit from CDOT would be required to install a natural gas pipeline within, or boring underneath, a state or federal highway right-of-way. To obtain this permit, CDOT would require the utility to submit a Utility and Special Use Permit Application, prior to construction.

4.7.1 Utility and Special Use Permit

This is the application for a license to place a utility on CDOT land or within CDOT right-of-way. It specifies that the licensee is the ultimate owner or entity who will take responsibility for the installation once construction is completed.

CDOT will provide a list of installation/construction criteria that will be required by the CDOT district where work is taking place (in this case, District 3 based in Grand Junction).

The permit application would also likely need a Certificate of Insurance from contractor as well as the Town of Dinosaur. Several drawings would be required as part of the submittal to CDOT, including plan views, construction details, typical sections, location maps, and traffic control plans.

There is no cost for the CDOT Utility and Special Use Permit, but traffic control measures are always required while in the CDOT RoW. Any crossings of paved roads with frequent traffic are usually required to be bored. When plowing or trenching, the ROW will be required to be seeded and restored to prior conditions or better.

This permit can be applied for online through the CDOT Utility/Special Use Application Portal on the CDOT.Gov website.

4.8 Colorado Department of Public Health and Environment (CDPHE)

CDPHE has several requirements that may be required prior to pipeline construction or hydrostatic testing, as described below.

4.8.1 Land Development Air Pollutant Emission Notice (APEN)

Land development projects that are greater or equal to 25 contiguous acres and/or 6 months in duration typically require the submission of an Air Pollutant Emission Notice (APEN) and may require an air permit (in some cases APENs and air permits are not required due to estimated air emissions below reporting thresholds). This project will not trigger this requirement with less than 25 A disturbance. Construction of service lines will persist for years, but construction of the NWPL connector, stations and gas mains should finish in less than 6 months.

4.8.2 Fugitive Dust Control Plan (FDCP)

The FDCP addresses how dust will be kept to a minimum at the project site. Control measures listed in the plan should be specific to the land development site. A permit, if required, will specify the type of dust control measures that were included on the FDCP. A separate FDCP specific to the site can be submitted in addition to the APEN but if not, the fugitive dust control measures listed on the APEN will be used on the air permit. Even if a permit is not required, fugitive dust control measures in the FDCP must be followed at the site.

4.9 Moffat County, Colorado

Moffat County may require a utility permit. The Moffat County issues utility permits for both private and public entities that wish to construct their facilities in a county road right-of-way. Most licensing agreements involve crossings or small, parallel encroachments within the right-of-way. Specifically, this will be for a directional bore (30 ft) and line encroachment (175 ft) along County Road 161 on the NE corner of town. This permit is $100 plus $0.25 per foot.

Moffat County also requires a bond of $5000 for any facilities built within the county right of way. Any line over 2-inch or 100 psig requires a casing under the road with a minimum depth of 48" for any gas line. A casing will not be required for this project since the pipe will be 2-inch PE and under the 100 psig threshold.

After two years the bond would be returned if no problems have occurred with the installation and operation of the pipeline at the site.

4.10 Rio Blanco County, Colorado

The proposed connector to NWPL in any of the 3 alternatives just barely nicks the corner of Rio Blanco County for about 1500 ft. The pipeline follows a 2-track BLM trail through this corner.

Rio Blanco County may require a Special Use Building Permit (SUBP) for any operations that construction that takes place in the county. This is a onetime $700 payment that helps cover the cost of any potential damage to county roads used in the transportation of heavy equipment, pipe, and other materials necessary to complete the job.

Utah. The proposed best alternative connection to the NWPL block valve would have a small meter station and about 1.5 miles of 3-inch PE pipe. In that case, these Utah agencies would be involved:

4.11 Utah Public Service Commission (UPUC)

Like the Colorado PUC, the Utah PUC administers gas utility service and compliance with gas pipeline safety regulations under contract with US DOT PHMSA.

The Dinosaur municipal gas system would not serve customers in Utah so would not require a CPCN to serve gas customers. The utility will be subject to the UPUC jurisdiction for compliance with pipeline safety rules at 49CFR Part 192, mostly for regulator station annual checks and periodic leak survey.

4.12 Utah Department of Environmental Quality (UDEQ)

UDEQ requires large construction projects to file a Notice of Intent (NOI) for a Stormwater General Construction Permit. UDEQ also has requirements for oil & gas related projects to report for the Centralized Air Emissions Reporting System (CAERS). Certain stipulations apply to these programs that this project may have to comply with. The minimal construction in Utah may not trigger these regulations.

4.12.1 Stormwater Construction General Permit Notice of Intent (NOI)

This regulation applies for projects disturbing 1 or more acres of land, or that are less than 1 acre but part of a common plan of development or sale that will ultimately disturb 1 or more acres.

The objective of the Permit for Construction Activities is to limit pollutants coming off a construction site so that the pollutants do not end up in a water body. Precipitation or storm events will mobilize pollutants at a construction site and carry the pollutants to a water body. The goal of the permit is to take steps to prevent pollutants from leaving the construction site and entering water bodies. Soil particulates are considered pollutants because, although soil particles naturally erode, construction activity exacerbates this process substantially. With soil erosion nutrients which are normally bound up in soil, are released. It is good and natural for nutrients to be in soil for plant growth, but if released to water bodies it causes degradation.

A Notice of Intent will need to be filed and a small fee paid to find out if this permit is required for this project. It may not be required since this project will not cross any defined streams or water bodies.

4.13 Uintah County, Utah

No permits should be required by Uintah County, since no county roads are involved.

5.0 EASEMENTS

5.1 General Information

Potential permanent and temporary easements were identified and evaluated for each alignment alternative for the supply pipeline. Based on a search of the surface owners throughout the project area, easements may be required from private, state, federal, and county entities, dependent on which alignment is chosen. Most of the distribution network will be built within town streets and state and federal roads, but there are a few segments where easements may be required. Each of these entities poses unique easement acquisition procedures, costs, and timelines.

5.1.1 County Road Right-of-Way Easement Acquisition

This project only crosses a county road in one location at CR 161 in Moffat County on the northeast corner of town. The Town of Dinosaur likely has an existing right of way easement for the existing water line in the road. A new utility permit and bond may be applied for if it is deemed a new and different utility. See Section 4.8 for more on Moffat County requirements.

5.1.2 Private Lands Right-of-Way Easement Acquisition

The NWPL supply pipeline proposed along the south side of town would cross two parcels of private land. If an easement cannot be obtained here, the line would have to be re-routed to the south through land owned by the BLM and Town of Dinosaur. This would make the supply pipeline slightly longer, thus adding cost.

Most of the distribution mains will be in town streets and alleys, state highway and federal BLM or NPS land. However, a section north of Hwy 40 will need permission from the private landowners in the vicinity. Most of this section lies on land owned by various private landowners. If RoW easements cannot be obtained from these landowners, then the route can go along the north side of Hwy 40 in CDOT RoW.

These larger landowners' agreements may be resolved with the availability of gas service.

Under FERC rules that govern most gas utilities, the portion of the service line across the customer's property technically belongs to the customer, while the gas meter assembly belongs to the utility. For this reason, a private easement is not usually required for a

service line across private property. This easement permission is implied when a landowner wants to add gas service and become a customer of the utility.

5.1.3 State Lands Right-of-Way Easement Acquisition

The section east from town along US Hwy 40 to the National Park Service complex, as well as the section along Hwy State Hwy 64 in town will need permission from Colorado Department of Transportation (CDOT). Crossings will require directional bores under the highway of Hwy 64 (Stegosaurus Fwy) at 2 places in town, and across US 40 just north of the County Welcome Center, and at Allosaurus Lane.

All land within the state highway RoW is CDOT property and no easements are usually granted. A Utility Permit would be required, and all construction and reclamation requirements specified by CDOT must be met. More details on the permit can be found in Section 4.6.

5.1.4 Federal Lands Right-of-Way Easement Acquisition

A BLM easement is obtained through a pipeline right-of-way grant application (SF-299) which is required to cross federal lands administered by the US BLM. The supply pipeline southwest of town is almost entirely on BLM land in Utah and Colorado. See Section 4.1 for more details on the BLM application process. The section on the east end of this project along US Hwy 40 and Harpers Corner Road that supplies the NPS facilities would have a similar application and review process. A separate RoW easement application through NPS may be required, although for past projects by PNG, the processes for BLM and NPS were combined into a single permit administered by BLM.

6.0 OPERATION AND MAINTENANCE REQUIREMENTS

The gas utility system will be relatively simple, with a delivery station at NWPL, a meter & regulators at the town border station, and all-new PE piping system throughout the community. The operating and maintenance or O&M tasks required for day-to-day operation are mostly simple tasks like monitoring the pressure in the morning and watching for any potential trouble such as nearby excavation.

6.1 Gas Pipeline Safety

Although the O&M workload is relatively low, the utility must respond immediately to any leak, suspected or actual, and extend lines and set meters at customer request. Nearly all the routine tasks are subject to federal gas pipeline safety regulations at 49CFR Part 192 *et seq*, which are administered by the Colorado Public Utilities Commission or PUC.

Under the Operator Qualifications or OQ rules in Subpart N at §192.801, most gas utility tasks must be done directly by, or under the close supervision of, a person who is qualified for each Covered Task.

The Town of Dinosaur employs a part-time Operator for its water and wastewater systems. That operator is licensed in Colorado to operate these systems. The Town has a full-time maintenance worker who can work on water systems, but only under the supervision of the licensed operator.

Operating a gas utility would be very similar. Some tasks such as meter reading and checking pressures could be done by any responsible person. The Town office staff can prepare the bills, handle the money, and prepare most reports to PUC and others. Town Hall can receive, log, and respond to all gas utility-related calls from customers. But work on gas lines or regulators or leak calls must be done by an OQ'ed operator. In addition to daily work, there are very specific records to keep and periodic reports to make, some of which are subject to OQ rules.

As this study progressed, the technical Operator of the utility was identified as one of the most critical parameters. The Town utility would require a fully OQ-ed operator; and a backup operator for times when the principal operator is unavailable or out of town. The backup also must be fully-OQ'ed, to respond to leak calls and emergencies and make repairs without supervision.

These are not full-time workload positions by any means but would be very difficult to cover with part-time workers due to the OQ rules, on which the CPUC is very strict.

6.2 Contract Field Services

The Town of Rangely has operated its municipal gas utility since 1979. It serves about 1200 gas customers and has 4 gas operators fully qualified under OQ rules. Rangely Gas was contacted about providing O&M services to the Dinosaur utility on a part-time, contract basis (Exhibit 2).

O&M tasks have generally been separated into the categories of field services and administrative services.

The following is a list of O&M field services that Rangely could provide, subject to execution of an O&M agreement between the towns:

- Operate the distribution system and all related facilities.
- Read meters monthly (See Section 8.1.6 on Itrons); this will provide raw data for input into the Dinosaur Caselle billing system.
- Set, change, and remove meters based on service orders logged by the utility.
- Exchange meters for testing according to the testing schedule.
- Conduct pressure checks in winter months (October through April) to ensure adequate service.
- Troubleshoot pressure problem areas and make recommendations for corrective actions.
- Operate the utility odorizer, check odorization levels periodically.
- Conduct leak surveys in accordance with the DOT requirements.
- Conduct leak investigations for all leaks called in by customers.
- Repair underground leaks.
- Repair above-ground leaks.
- Perform annual and quarterly pipeline patrols.
- Perform annual inspections on critical valves.
- Perform annual regulator station inspections.
- Qualify Dinosaur personnel to do OQ tasks as able.

6.3 Contract Administrative Services

The following is a list of O&M administrative services that Rangely could provide:

- Assist Dinosaur in ordering parts and supplies.
- Update Automated Meter Reading (AMR) system records for billing.
- Perform meter reading services each month, including updating and uploading the AMR information into the AMR reader, reading the meters both AMR and manual reads, and providing raw data for input into Dinosaur's billing system.
- Gas system operations would follow the Dinosaur Natural Gas Rules and Regulations as filed with the CPUC, if applicable.
- Provide engineering and support for minor projects such as service line and repair work.
- Maintain DOT records, prepare and submit all operation-related reports required by regulatory agencies.

The above Field and Administrative services will be conducted in accordance with industry standards. Many of these are subject to requirements of the US DOT PHMSA and regulations at 49CFR Parts 191-192, as administered by the PUC pipeline safety section.

As the Dinosaur utility matures, some of these tasks could be done more easily by Town of Dinosaur employees, such as pressure and reg station checks, and preliminary checks on reported leaks. The two entities should adjust the task list and charges as these duties change.

6.4 Other O&M Tasks

The following items fall outside of the normal scope of routine operation and maintenance. Depending upon the type of work, these items could be handled by Dinosaur, or by Rangely as a separate contract item, or third parties.

- Install extensions or laterals off the distribution pipeline.
- Install service lines.
- Install or remove underground valves.
- Major repairs caused by fire, flood, explosion, land movement, vehicular damage, and similar occurrences which may cause a safety-related condition.
- Major extensions, replacements, or improvements.
- Facility relocations required by jurisdictional agencies.

- Excavator operation which exceeds the practical capability of available equipment, or in environmentally sensitive areas.
- Meter testing and refurbishing.
- Engineering, design, and supervision projects.
- Certified welding on steel pipe containing natural gas.
- Environmental disposal and remediation activities.

7.0 PIPELINE ROUTE ALTERNATIVE ANALYSIS

7.1 Introduction

In the Western states, especially those places at higher latitudes and altitudes, natural gas is the premier fuel used for heating structures. The 2018 US Census estimates showed that Utility (natural) Gas was used in 69% of all homes in Colorado, and 82% in Utah.

Compared with the rest of the West, Dinosaur has already employed all alternatives to natural gas, for decades. Most of those 47% using propane and 32% with solid fuels and 21% on electric heat would likely prefer to have natural gas, if available. As discussed later herein, there appears to be no better, practical alternative to natural gas heating, either currently available or even remotely over the horizon.

For most natural gas users, especially for a very small and remote community, the only feasible source of supply of natural gas is a direct connection to a gas transmission or gathering pipeline. Gas is also available with trucked-in supply of Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG). These alternatives were eliminated without evaluation, due to known limiting factors we have encountered on other similar projects. LNG and CNG are technically very complex, Dinosaur is far from any existing supply and there is prohibitive cost of developing a new one; and the cost of trucking adds greatly to the gas cost, vs a simple, one-time nearby pipeline connection.

The following three route alternatives were evaluated for the gas supply pipeline from NWPL, taking into account cost, time, and design/permitting considerations. Each alignment was traversed from start to finish, identifying visible topographic, potential wetland, and existing infrastructure constraints. Alignment alternatives were compared based on length, estimated cost, capacity, environmental considerations, and source of gas.

7.2 Woods Government Tap N40.177° W109.037°

7.2.1 Description

NWPL refers to a “Woods Government tap” near MP 295 on the mainline, in Colorado about 4600 ft southeast from the state line. NWPL has a 2-inch side valve connection to the 26-inch mainline that could be re-activated. This is the location of an old tie-in from a gas well. From this NWPL valve runs a visible ground scar for a pipeline headed northeast about 8000 ft to an old well pad for a plugged & abandoned well.

7.2.2 Design and Permitting Considerations

This NWPL connection is the nearest to town, if the old well pipeline could somehow be used. From Colorado Oil & Gas Commission records, this well in Section 36 is named the Karis Government (OWP) #1.

This well has not been active since at least 1995. From the COGC drilling date and other parameters, we can surmise it was steel pipeline laid in the early 1970s and was not likely protected from corrosion. DOT pipeline safety regulations were new then and probably not required. These unknowns would prevent its direct use, but a 4-inch or larger steel line might be used as a conduit for a new PE line. The insertion process would require less digging but would likely cost more than simply direct plowing a new gas line.

This route is also quite harder to connect to Dinosaur, through a series of winding existing 2-track trails, mostly BLM land then two different private parcels of ranch land. There is a 0.8-mile segment of undisturbed BLM land through which permitting might be delayed for added scrutiny. This route winds around the head of a little canyon and has several challenging rock shelves that would be difficult to plow through. Total distance is aprx 27,600 ft on the more direct cross-county route; or 33,500 ft northwest along NWPL then up the state line as described in Section 7.3.2.

7.3 State Line crossing N40.184° W109.050°

7.3.1 Description

NWPL crosses from Colorado into Utah near MP 296 on the mainline. The NWPL corridor was established first, then a natural gas liquids or NGL line was built parallel most of the way from NM to WY; then a CO_2 line from SW Wyoming to Rangely for oilfield flooding and tertiary oil recovery. This location is about the same distance from town as Woods Govt tap, as the crow flies.

7.3.2 Design and Permitting Considerations

The NWPL connection at the state line is quite simpler than the Woods Govt route, with an obvious route along an existing 2-track trail north up the fence on the state line, then several diagonal connecting trails to the Blue Mountain Village road into the southwest corner of Dinosaur. This route is entirely on BLM land, and permitting along existing trails would be fairly routine. Total distance is aprx 28,800 ft.

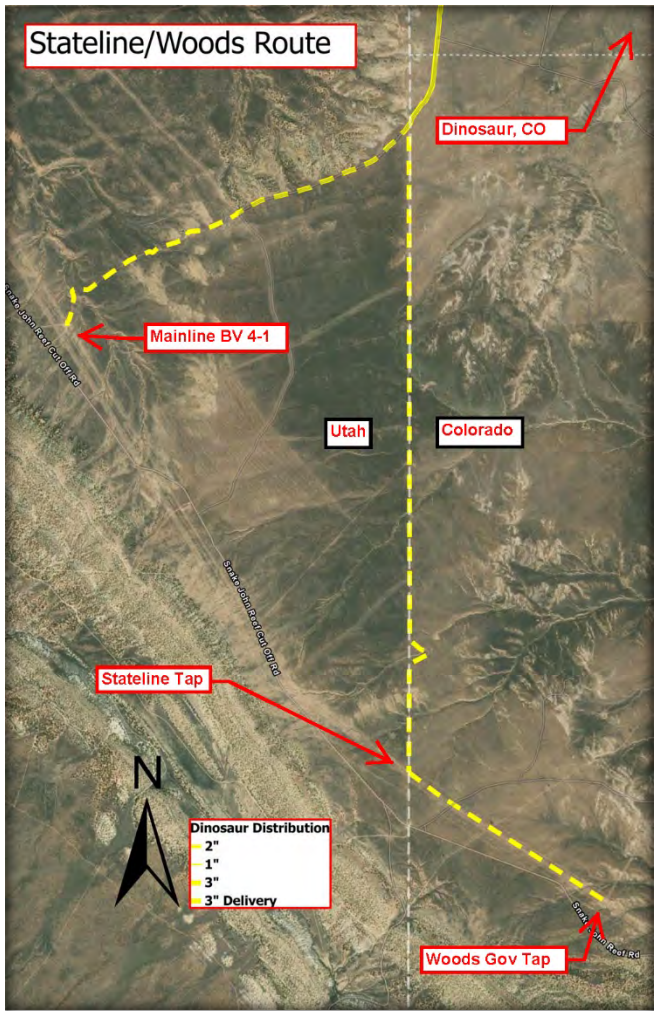


Figure 7.3.2: Stateline and Woods Gov. Route

At the state line is an odd two-skid, pipe & valve header on the south edge of the pipeline corridor. One pipe leg goes underground and seems to point toward NWPL. Although cut off, the other leg lines up with a top-of-ground black PE line that runs in Utah about 10 miles south toward Bonanza, ending at the large water tank that was associated with the old Gilsonite slurry line over Baxter Pass to Grand Junction. The pipe coating and valve styles seem to be from the 1980s.

This is not a header or a PE line that would be used for either CO_2 or NGLs, and there are no other pipelines out there. There certainly is not an obvious source (or use) for water and the Bonanza tank. This pipe skid and PE pipeline had to be used for natural gas. In 2015 notes, NWPL once mentioned a "Canyon Pipeline" that may have emanated or terminated at the Woods Govt tap.

Yet NWPL says they have no record that there is now, or ever was, a valve or connection into NWPL mainline at the state line. NWPL in the past gave an estimate to "hot tap" the mainline for $50,000, or even $20,000 using their own equipment and crews, but these figures are now likely quite higher.

The Utah side of the fence seems the more suitable location for a meter station, with noticeably cleared sagebrush and more previous disturbance. There is a corrosion protection rectifier for NWPL nearby with commercial REA power, that could be used for telemetry of flow conditions and alarms.

However, there is a subtle but very significant difference in locating a delivery station in Utah vs Colorado: the Utah station would cause gas to move across a state line (although maybe only 100 ft) and would be considered an Interstate pipeline and subject to FERC jurisdiction. See Sec 4.1 for further discussion.

This same state line route could be used to connect to the Woods Government Tap. The Woods Govt would be a longer route, but easier to construct to an established tap than the other overland Well route discussed in Section 7.2.2.

7.4 Mainline block valve 4-1 N40.208° W109.075°

7.4.1 Description

NWPL has a mainline block valve designated "4-1" about 2.1 mi northwest of the state line in Utah. These mainline valves are not very common, with DOT pipeline safety regulations allowing up to 20 miles between valves in sparsely populated areas. This valve station is about 300 ft northwest from MP 298 marker.

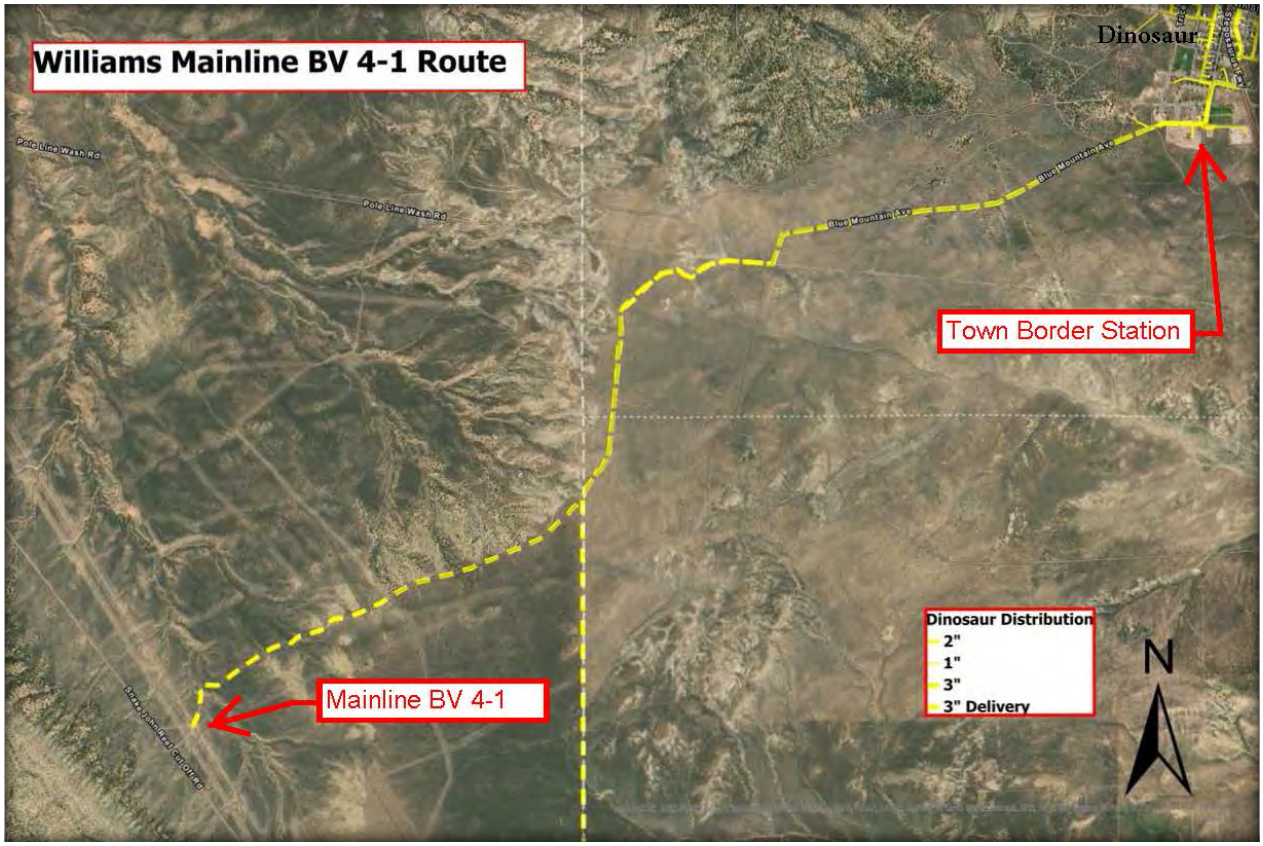


Figure 7.4.1: Mainline BV 4-1 Route

7.4.2 Design and Permitting Considerations

The mainline valve assembly has a 26-inch through-conduit gate valve and a 6-inch blowdown valves and risers on both sides of the valves; with 2-inch side valves on both risers. There is also a 2-inch valve in a valve box about 60 ft northwest of the main valve, which once provided fuel for a generator. This facility with three possible supply valves would enable a very simple connection to NWPL.

This is the shortest alternative route from Dinosaur, along existing 2-tracks from the starting "181920 Road" shown on Google Earth to connect to Blue Mountain Village road into Dinosaur. This route nicks the corner of Rio Blanco County for 1500 ft and is entirely on BLM land. Total distance is aprx 23,000 ft so is more than a mile shorter than the State Line route. This route would also require a FERC exemption. See Sec 4.1 for further discussion.

7.5 Comparative Analysis of Alternatives

Technical feasibility, potential environmental impacts, and financial cost were all considered in comparing the alignment alternatives. The Woods Govt direct route was ruled out for buildability. The comparative analysis for the others weighed the extra cost of 1.1 miles of pipe to the State Line site, vs the cost of a FERC exemption at the Block Valve site. See Sec 9.1 for cost data.

7.6 Recommended Alternative

The NWPL Block Valve site is favored over the other alternatives in every category except the Regulatory step of a FERC exemption. The added cost and risk of the FERC application seem to be quite less than the longer pipeline alternatives.

8.0 DESIGN ELEMENTS

Design Criteria for this project are fairly routine for a gas utility: the proposed Dinosaur gas utility will receive and transport gas from Northwest Pipeline; will present a gas main to nearly every address in Dinosaur and its environs; and will run a service line to the building wall of every structure that requests gas service.

8.1 Preliminary Design Information

The utility system will include a connection and meter to NWPL and supply pipeline to the edge of Dinosaur; two regulator stations to control the gas pressure; and gas distribution mains and service lines and meters. The specific Design Elements are summarized here.

One of the main purposes of this PER study is to identify the potential customers and gas load of a gas utility serving Dinosaur.

Our company PNG has extensive experience and decades of data on customers of small-town utility systems in high altitude, remote places. Using that knowledge on the prospective Dinosaur system, we have come to the following terms and assumptions:

Decatherm or DTh is a term not widely used outside gas production and transmission. An "MCF" or 1000 cubic feet of gas is more common. But because a gas utility must buy BTUs from its pipeline, it should sell BTUs to customers. The BTU content of gas varies widely, but for a transmission pipeline is usually around 1000 BTU per standard cubic foot. In natural gas commerce, a Decatherm is the volume of natural gas required to produce 1 million BTU (MMBTU) of heat, before any losses. This is roughly, but not exactly, 1 MCF.

The term *Deca*therm means 10 Therms. This was an arcane term developed by gas utilities because gas meters read in "CCF" or hundred cubic feet. On the meter index, 1 CCF is roughly 100,000 BTU of energy, which is the definition of a Therm. But at higher altitudes like Dinosaur at 5900 ft, a pressure correction applies. [Note: this would be so much easier in kilowatt-hours, where 1 DTh = 293 kWHr.]

Customer profile. Dinosaur will offer service to about 150 homes and 30 commercials in the Town and outskirts and NPS complex to the east. The 10 largest commercials and 15 of the smaller ones use propane and are assumed to readily convert. Of the 150 potential residential customers, 47% use propane and now and can easily convert to natural gas.

Some of those with wood or electric heat will convert for significant savings in workload and cost. Based on a similar startup project in Wyoming, an overall conversion rate of 70-75 percent is feasible. In the first 2 years of operation, 100 (or 2/3rd) of residentials are expected to convert. This customer count is used to estimate gas loads and the fixed monthly service charges.

Annual gas load is mostly used for economic feasibility modeling. The margin charged on a volumetric basis (what customers actually used) is most of the revenue of a gas utility. Each home is expected to use 70-75 DTh per year, and the commercials average 120 DTh per year. The total expected load is 10-15,000 DTh per year of sales volume.

Monthly gas load is used for financial budgeting of expenses vs revenues. Operating expenses are fairly uniform throughout each month of the year. But gas utility revenues are totally hostage to outside temperature. The Dinosaur gas utility would sell 30-33% of the entire year's gas in December and January. But these revenues must be conserved for July and August expenses, when gas sales are 2% of annual. The gas volumes in four summer months June to September barely raise enough to cover a month's fixed costs.

Daily gas load, particularly *MDQ* or Maximum Daily Quantity, is critical to the Demand charge to be negotiated with NWPL; further discussion in Section 9.2.3. Based on the customer mix and expected volume, MDQ is estimated at 130 DTh per day.

Hourly gas load, specifically *MHQ* or Maximum Hourly Quantity, is the basis for sizing and designing all meters, regulators, and pipelines. MHQ is usually about 1/18th of MDQ, not 1/24th, to account for the typical daily peaks at 7-8am as heaters fire up, folks shower and prepare for their day. Based on this, MHQ will be 7 DTh per hour. This energy value is converted back to about 7 MCF of volume for gas equipment sizing.

All sizing calculations were increased to 10 MCF, to ensure that any component of the system can easily handle its share of maximum hourly volume. This +43% over-design factor is actually 2-3 higher, because the system can operate well above 20 psi from the TBS (see Section 8.1.4).

Pipe spec. All mains and services will be built of polyethylene or PE pipe, which can be fused & installed by utility workers with modest special training. All pipe will be Medium

Density Polyethylene or MDPE certified to ASTM-2513 for gas utility service. The system design pressures are 20-100 psi, which is within the typical pressure range for PE pipe. We have specified a Standard Dimension Ratio (of OD to wall thickness) of SDR-11 that is most widely used by gas utilities.

DOT pipeline safety compliance will be simplified for this new, simple system.

8.1.1 NWPL delivery station

The recommended alternative for the natural gas delivery point and supply pipeline is the Block Valve connection to NWPL as discussed in Section 7.6.

NWPL will install a meter to deliver gas to Dinosaur (Exhibit 3 pg. 1). As described in their proposal, NWPL will install a 2-inch Coriolis effect meter with electronic flow measurement or EFM to continuously measure gas flow. This meter will be connected to the Williams NWPL control room via radio link.

Dinosaur will receive gas at the full NWPL mainline pressure that averages 450 psi but can range up to 809 psi Maximum Allowable Operating Pressure or MAOP for that section. The Dinosaur supply pipeline will have 100 psi MAOP, so Dinosaur will build a simple regulator station to reduce the pressure into the plastic system. This station will have a 1-inch regulator and a second monitor regulator to comply with DOT regulations. This is a simple, foolproof setup that could go months without checking. There are no other controls or remote monitor required at this location.

This meter & reg station will be built on a small parcel of land and fenced at least 10x20 ft for security. This parcel must be separate from the existing fenced-off NWPL mainline valve station. The NWPL proposal requires a 100 x 100 ft minimum parcel, most of which will not be fenced, and will be included in the BLM permit process.

8.1.2 Supply pipeline

From the NWPL delivery and regulator station a 3-inch MDPE pipe would be installed by plowing or trenching in BLM right-of-way trails and within or adjacent existing BLM trails (See Section 7.0 on PL Routes). This pipeline segment will be built and tested to allow a MAOP of 100 psi, which is the maximum practical limit for plastic pipe.

The supply line from NWPL is not considered a transmission pipeline subject to the additional transmission regulations in DOT Part 192.

8.1.3 Town Border Station

The supply pipeline from NWPL terminates at a Town Border Station or TBS. At the TBS the pipeline pressure is reduced from the 100 psi supply pressure to 20 psi for the distribution system.

The TBS will have a simple 1-inch regulator-monitor station nearly identical to the NWPL reg station, with different setpoints (Exhibit 3 pg. 2). This two-pressure setup is for the ultimate design load, with a large design factor. For the first several years of startup operation, this regulator may not be needed, as the entire supply line and distribution system could operate at 30-40 psi from the NWPL regulator.

The TBS will also include a meter, such as a Roots 5M175. An EFM flow computer tied to the meter will have a cellular phone modem, and flow & pressure parameters can be uploaded continuously to a database that can be accessed by any authorized user. The hourly-daily-monthly flows & pressures are invaluable as long-term records for many different purposes.

The EFM computer will also be used to drive a simple gas *Odorizer*. As required by DOT Part 192, all gas flowing through distribution lines and into customer piping must be odorized. Any leak must be detected by a person with normal sense of smell, at a gas concentration less than 20% of the LFL or Lower Flammable Limit (or about 1% gas).

We associate the smell of gas with sulfur or “rotten eggs” (which few people now have actually smelled). Natural gas is mostly methane CH_4 and has no odor. Most gas through transmission pipelines like NWPL has been processed repeatedly, which removes the contaminants in produced gas that have an odor. To ensure that most people can smell a gas leak, an odorant such as methyl-ethyl sulfide or “mercaptan” is introduced at a few parts per million.

The odorizer for Dinosaur is like similar small systems in Pinedale and Walden. A Kingtool odorizer is a simple 8-inch pipe bottle, buried vertically with 2 gallons of odorant. A solenoid valve sends puffs of gas through the top space of the bottle then into the town

system. The pulses come at intervals proportional to flow rate, as signaled by the meter EFM computer. This system is fairly foolproof and externally odor-free, but needs periodic checking and is best located at the TBS.

The TBS will have simple alarms and an auto dialer, to give warning of any anomaly in the pressure of the supply line or distribution system. The gas regulator and meter stations at NWPL and at the edge of town are completely autonomous and require minimal maintenance or monitoring.

The TBS station will be built preferably on Town property, on a parcel at least 50x50 ft and fenced for security.

8.1.4 Distribution System

From the TBS, the distribution system mains run along public right of ways in most alleys and streets of Dinosaur. Plan sheets for this alignment are provided as Figure 8.1.4. A construction cost estimate for the proposed project is found in Section 9.1.

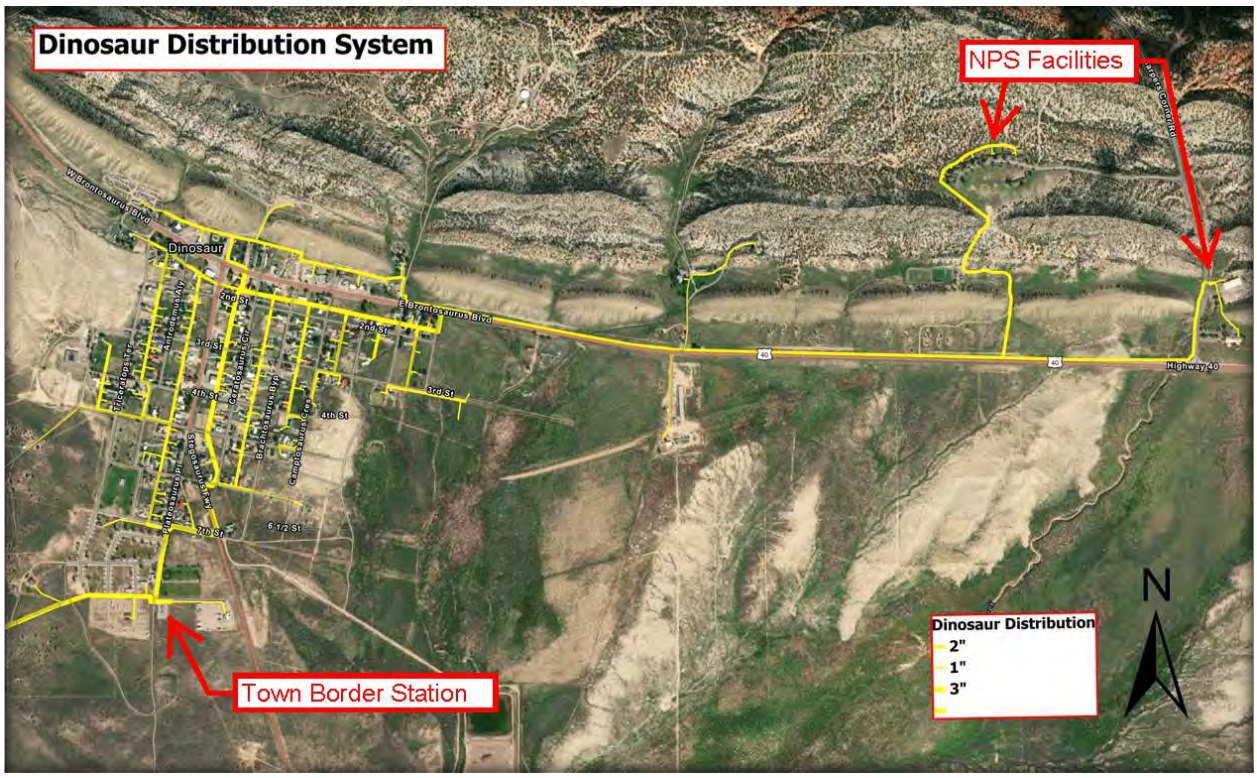


Figure 8.1.4: Dinosaur Distribution System Map

The distribution system will be built to MAOP 60 psi, which is the maximum pressure allowed for a single regulator at each customer service point. The system can be operated at a much lower delivery pressure of 20 psi, which is adequate for the foreseeable future and reduces exposure to damage if a line is accidentally hit.

From the TBS a 3-inch SDR-11 MDPE pipe extends to US 40 and east to the edge of town. This main serves as a backbone for the 2-inch SDR-11 MDPE lateral mains down most alleys and streets of Dinosaur. The larger 3-inch backbone main would maintain adequate pressure and supply for all foreseeable future users at all points in the Town.

From the eastern town limits, a 2-inch main would be installed by plowing or trenching along US 40 to serve several rural homes and the Dinosaur National Monument facility and employee housing.

As system load matures, or if a large demand develops, the system pressure can be increased as needed above 20 psi and up to 60 psi. Further, 2-inch lines can be latticed together (in the future) with other mains to provide looping. These steps would help ensure that each section of main is supplied with sufficient pressure to provide each customer with adequate peak-hour capacity.

8.1.5 Services

As the gas mains are installed and customers sign up for gas service, the new utility will also build gas service lines and meter sets to each new customer.

The standard service line (Exhibit 4)will be 1-inch MDPE pipe, extending from a *tap tee* on the main, to a riser at the building wall or other spot designated by the customer. The tap tee has an *excess flow valve* or EFV, to stop the flow of gas after a catastrophic failure, such as damage from a posthole digger, or a fire that damages the meter.

Under FERC rules, the pipe buried on the customer's property technically belongs to the customer. All above-grade facilities remain with the utility, which could be retrieved if the customer stops gas service. The customer essentially owns the buried pipe, which would not be retrievable.

8.1.6 Meters

All meter sets will be standardized and built with prefabricated meter bars and components for uniform function and appearance (Exhibit 4).

Meter sizing for nearly all customers will be the familiar diaphragm style meter, either American or Sensus, in 3 standard sizes 250-400-630 (cubic feet per hour rating).

The school-community hall and NPS shop (if converted) might be large enough loads for a 2-inch PE service line and a Roots 3M-5M rotary meter.

The cost estimate for each customer service includes a $60 radio AMR transmitter for Automated Meter Reading. The Town has Neptune AMR endpoints and a radio-based data collector to read its water meters. But Neptune does not make AMR endpoints for *any* style of gas meter.

The most widely used gas AMR system is made by Itron, with about 50 million gas meter endpoints in service. If Rangely is contracted to provide O&M services to Dinosaur, they could read the Dinosaur gas meters using their Itron equipment and provide the meter data file for the Town's billing system.

8.1.7 Billing System

Town of Dinosaur runs its water billing on Caselle software, based in Provo, Utah and saturated among towns and counties in the region. PNG has used Caselle for gas billing since 2013. PNG helped Caselle to develop their program for billing Therms or BTU value, instead of Cubic Feet as measured by the meter and as billed by many small gas utilities. The NWPL delivery is in BTUs, so the Town should bill its customers in BTUs. The gas utility would add a Gas module to its existing Caselle platform.

8.1.8 GIS Database

Mapping for the proposed gas utility system is overlaid on the new GIS system as developed for this study. The existing water and sewer systems, streets and structures in Dinosaur were entered into an ArcGIS database as a significant part of this PER.

The study included updating the Town's maps of water & sewer systems, as part of the process of laying out a natural gas grid to serve the Town. The Town had a collection of

maps from various water projects in 1981-1984-2003, but not all on the same base map, and all on paper sheets with no subsequent updates nor access to a digital version.

All previous maps were consolidated into a single geo-referenced database in ArcGIS. This is a massive online database to keep geo-referenced data, like a pipeline or valve or manhole that have been located "in 3D space" using GPS coordinates. Other attributes include tables describing size-length-material-age, or pictures / video, written notes, purchase, or construction invoices etc. These attributes are tagged to a specific pipeline segment or feature or address. These attributes can be pulled up by tapping on a tag on the map.

The Dinosaur water and sewer pipelines are now depicted in GIS, along with key surface features like water valves and sewer manholes. We spent several days onsite with a precision GPS instrument to verify as accurately as possible the geo-referenced GPS positions of these surface features. We have identified many such features that are on the maps but not easily located on the surface, due to silting, paving over and possibly old mapping errors. Many of these features have photographs and other documents available with a tap on a nearby icon.

All these lines and features and attributes can be overlaid on any number of base maps, such as simple maps (like a Rand McNally road map) or USGS topographic maps or satellite photos (like Google Earth). Each different type of attribute (gas line, water valve, meter, propane tank, building footprint outline, ownership etc.) is on a "layer" of data that can be turned on or off, to best depict the intended use of the map. The database includes the Ownership layer of GIS data from Moffat, Rio Blanco and Uintah Counties, that shows property lines and current ownership and property data.

Though we did our best to accurately map and geo-reference the Town's water system, there were many isolation valves, manholes, and other facilities that were un-locatable in the time allocated. This was due to inaccurate old information or more likely buried or paved over facilities. It is recommended that the Town conduct a more in-depth valve survey possibly with a hydro-vac truck or machinery to locate these missing facilities. This would make isolation and general operations of the water and sewer systems more efficient and effective. The GIS mapping has laid out which facilities were previously mapped but un-locatable. This should make for a good starting point for such a project.

The water & sewer system maps are more accurate than ever, which makes easier the layout of a gas utility. The new GIS maps include the proposed gas line from NWPL, the gas utility grid for the entire Town, and a gas main to the National Park Service complex to the east. The utility lines are enhanced with dozens of photos and other attributes saved to the online database.

The best feature is that the ArcGIS database mapping is available in real time, with an annual subscription for about $500 through ESRI. All data are kept online. Using a free Collector application available to any smartphone or tablet, the Dinosaur maps are instantly available for viewing or printing.

Every data point can be easily accessed by any authorized user, and updated onsite, online in real time. Any inaccuracies can be corrected as found and an accurate record of facility locations can be kept at hand, at all times, for all Town users.

9.0 RECOMMENDATIONS AND IMPLEMENTATION

9.1 Financial Analysis

We have developed a financial model to determine the feasibility and sustainability of the project. The various financial reports for O&M Expenses, Profit & Loss etc. are shown in Exhibits 5, 6, and 7. These are based on the actual forms used by Colorado municipal utilities to annually report their financial status to the CPUC.

The following sections discuss the assumptions made and techniques used in preparing the financial analysis.

9.1.1 Capital Costs

Detailed cost estimates were prepared for each alignment alternative. Table 9.1.1 depicts the cost estimate for the preferred alignment alternative. Approximately 75% of the total capital expenditure would occur during the first year of construction. Most of the remaining capital, except the amount held in the reserve fund, would be spent in year 2 of construction. The total estimated capital cost $1.27 million.

Dinosaur Natural Gas	*System Cost*			
Feature	**Qty**	**Unit Cost**	**Amount**	
Dinosaur Supply Pipeline & Distibution System				
NWPL delivery meter station - Williams PL charge			200,000	
MAOP Regulator station			15,000	MAOP Reg Station
Town Border Station at Dinosaur (meter, regs, EFM)			20,000	Odorizer, MAOP Reg Station, Meter, Flow Computer, etc.
Odorizer & odorant			5,000	
Pipe 3-inch PE for Supply line & distribution Mains	29,835	$ 1.69	50,400	
Pipe 2-inch PE mains throughout Dinosaur	31,835	$ 0.78	24,800	
Couplings, fittings, tracer wire for mains			10,800	
Valves w/ valve boxes	30	$ 227	6,800	
Line markers	80	$ 25	2,000	
Tax on matls (Mains & Services, Ops Equip)			7,900	Freight included in ISCO mtrls. Cost
Plow Construction cost (3-inch Supply line & Mains)	23,660	$ 2.70	63,900	
Plow cost (2-inch Mains)	16,385	$ 2.55	41,800	
Trench Construction cost (3-inch Mains)	5,545	$ 18.50	102,600	
Trench cost (2-inch Mains)	16,385	$ 17.50	286,700	
Bore Hwy 64, Hwy 40, town streets 3" PE pipe	630	$ 26	16,400	$120,700 Total main construction cost.
Bore county, town, NPS streets 2" and 1" PE pipe	1,925	$ 21	40,400	
Service Lines & Meters - matls & construction per Std Svc	160	$ 800	128,000	
Extra length services over 200 ft	5,500	$ 2.50	13,800	
Ops eqpmt (Electrofusion & tools, Sensit G2 leak det)			8,000	
ROW, permits, easements on BLM, CDOT, County			10,000	
FERC Exemption filing			10,000	Estimated hours worked by Stev and Bruce to obtain FERC Exemption
Engg, GIS, ROW & Permits, Inspection, initial DOT setup	15%		159,600	
Total System			**$ 1,223,900**	

Table 9.1.1: System Cost of Preferred Route Alternative

Multiple sources were utilized in preparation of the cost estimates. Current and historical cost information was obtained from Pinedale Natural Gas, local contractors, and various pipe and supply companies.

9.1.2 Operating Costs

Rangely Gas provided a cost estimate of $32,000 annually for the O&M tasks that Rangely could perform (Exhibit 5). The remaining billing, administration and operational duties by Dinosaur personnel are estimated to cost about $27,000 annually. The total annual O&M cost estimate is $59,000.

9.1.3 Assumptions

The analysis assumes the average annual residential demand is 70-75 DTh. This is an estimate based on local propane use data (which is fairly limited), and historical data from similar housing types and climate conditions in Walden. This typical residence or small commercial structure would now use 700-800 gallons of propane annually.

The commercial load is trickier. Most small towns have more public buildings than Dinosaur, like schools and courthouses that are larger and use more energy. A typical community would have a mix of commercial buildings that average 250 DTh per year, or about 2700 gallons of propane. There are only a few identified structures in Dinosaur that use that much, and the current average is closer to 120 DTh. The planned Community Center and NPS shop would use about 500 DTh each.

Conversion rates are another critical assumption. The first 2 years are the most sensitive time in the project's development. The utility must offer natural gas at a rate that is substantially lower than the existing propane-electricity-wood heat, to encourage early conversions and quickly start to cover the operating expenses. The model assumes that Town Hall, the library, fire department and county buildings, and most businesses will all be converted as soon as practical, such that those loads (and revenues) are placed on the system as early as possible. See Figure: 9.1.7.

The average cost associated with a service line is just under $800. Exhibit 8 shows a detailed cost breakdown for a standard residential or small commercial connection. This estimate is for a typical 65-foot service line from the main pipeline to the residence,

including all meter components. For a longer line, all the materials and costs are the same except for the length of pipe and trenching.

We identified 208 potential services, with 195 that range from 10 to 200 feet in length (average 65 ft). There are 13 longer services at more than 200 ft from the main. There would be little cost difference for most services from 10-200 ft, with extra cost for the longer ones. Some of these 208 serve an address that is currently unoccupied, and not all potential users will convert to gas. The cost estimate accounts for 160 services realistically achievable in 5 years, including 10 services over 200 ft. See Figure 9.1.1

The cost estimate includes the entire cost of the service lines and the extra footage. In Pinedale and Walden, the utility typically charges $400-500 of the cost of the standard service, and all the extra cost. Dinosaur will have to weigh the relative benefit of collecting some of this capital cost from a potential customer, especially the extra-longer cost, vs quicker conversions when the consumer's upfront cost is minimal.

Conversion costs will vary from residence to residence based upon their current heating setup. Residences that are heated with a propane furnace and already have forced air can be converted as easily as changing small components in the furnace for a cost as low as $50. If the propane or electric forced-air furnace is older, it may need to be replaced at a cost upwards of $4000 (but a likely large jump in efficiency). In residences currently heated with electric baseboards, a furnace and duct work or boiler and radiators is not likely feasible.

In most cases, an electric or propane water heater will need to be replaced entirely at a cost of $500-750. With the ultra-low cost of USDA financing, the new utility could fund a $400-500 water heater credit for every new conversion. This credit would encourage quicker conversion to natural gas and create a significant baseload in the summer months. See Figure 9.1.7 (b)

9.1.4 Fuel Cost Comparison

Over the entire United States, natural gas is used in almost 60 million households, and a 48% market share. This compares with 39% for electric heat. Propane is far less prevalent at under 5%, as is fuel oil, which is rare outside New England.

The main reason is economic. In places where available, natural gas has historically had the lowest retail cost per BTU unit of energy of all common fuels. The difference is substantial, especially in gas-producing regions like Colorado and Utah, where gas heats 69% and 82% of all homes.

To be successful, a Dinosaur gas utility would need to buy gas at wholesale, pay NWPL and marketing fees, mark up the cost to cover operating and financing costs; and then substantially beat the current cost of retail propane or electric heat. As tough as that sounds, the numbers still favor natural gas.

Propane. PNG has decades of detailed monthly history of wholesale gas and propane costs, from gas and propane utilities operating in the region. The Rocky Mountain region produces much more propane than can be used in the warmer months. But propane is expensive to store in pressurized tanks, and the winter demand is quite higher than production. The result is wide supply-demand fluctuations in propane prices between summer and winter, often swinging substantially within a month or even a week.

Natural gas prices also vary with seasons, but not nearly as much as propane. Any meaningful price comparison must use weighting factors for higher usage in winter during higher seasonal prices, and low prices and low usage. These comparisons show a clear price advantage for natural gas at the wholesale level. See Exhibit 9 for Historical Gas Cost Comparison.

Over the last 20 years, the wholesale cost of natural gas was $3.70 per MMBTU or DTh (see 8.1 definition), weighted for winter usage. Propane was $1.03 per gallon wholesale, or about $11.30 per DTh.

Dinosaur has had several propane suppliers, but delivery charges from Vernal, Craig or Roosevelt are generally $1 per gallon or more ($11 per DTh). A utility can deliver natural gas at the same margin or less, giving a price advantage of $11.30 less $3.70 or $7.60 per DTh. This is equivalent to saving 69¢ per gallon, or about 34% reduced heating costs.

Over the past 10 years, this comparison was $2.99 for gas and $12.34 for propane, which would save 85¢ per gallon, or about 40% reduced cost at retail.

The past 5 years have seen lower fossil energy prices. The weighted cost comparison was $2.44 for gas and $8.71 for propane, which would save 57¢ per gallon, or about 32% reduced cost for most consumers.

Energy markets are historically volatile, but the last decade has presented more significant swings than usual in energy costs due to worldwide economic forces. The Great Recession of 2008 (and market manipulation by big energy players) saw crude oil prices up to $150 per barrel, then down in the $40s, with several bounces. Although propane is produced mostly from gas wells, the price per BTU more closely follows crude oil, since propane can be used or produced as part of gasoline refining.

Petroleum prices had slowly settled near the $60 /bbl level last year. Then the CoVid pandemic unexpectedly crushed demand for oil, with airlines dropping flights to near zero, and millions working from home and not commuting. Crude oil prices crashed to $20s then lower, and propane along with it, to prices not seen in 30 years. April propane bottomed at 40¢ per gallon, where it hardly mattered what other fuels could save. It's not apparent that local propane suppliers dropped their prices correspondingly.

The CoVid pandemic and a possible change of politics for the US could spell a long-term change in fossil energy demand and prices. But at the present, historic price comparisons give natural gas a very clear edge over propane.

Electricity. Natural gas pricing has historically held even more dominance over electric heating in most markets. The comparison is not quite as easy as comparing BTU prices, because of differences in heating equipment. Although electric heat is promoted as "100% efficient", most power comes from a heat-to-power conversion from coal or gas that is only 20% efficient.

Compared with a modern gas furnace with gas at $10 per DTh, a typical electric forced-air or baseboard heater would break even at about 3.8¢ per kilowatt-hour.

Moon Lake Electric serves the Uintah Basin from Dinosaur to Strawberry Reservoir. It was formed in 1938 as an early adopter of the REA concept that pushed electricity to rural homes and farms all over the US. The co-op was formed as a member-owned, nonprofit utility with long-term, low-interest REA financing. Moon Lake was a major recipient of

hydropower from Flaming Gorge reservoir and other projects, and from the Bonanza coal-fired generation plant. It has also benefited from oil-gas-minerals production in the area, with almost ¾ of its customers in production facilities.

The result is one of the lowest rates per kWhr anywhere in the US. At 5.6 to 6.2¢ per kWhr for normal users, the Moon Lake rate is quite lower than regional utilities Utah P&L at 9.9¢ and Xcel Colorado at 11¢. Even so, the current cost of heating with Moon Lake is about 20% higher than the expected cost of natural gas heat in Dinosaur.

The costs of transition to a reduced-carbon energy future will have profound effects on all utilities and their customers. Any forecast will be inaccurate, but because of hydropower, Moon Lake should have an easier transition to reducing carbon, compared with UPL and Xcel with more fossil-fueled power.

Wood heat. Humans have used wood for cooking & heat for a sizable fraction of a million years. We now have choices to pay for convenience, and wood heating usually takes a lot of work. Places with nearby forests and beetle-killed trees seem to be unlimited sources of fuel, so the cost comparison is quite surprising.

Natural gas should be available at just over $10 per MMBTU at retail through a Dinosaur Gas utility. This would compare with burning wood at $100 per cord through a high-efficiency woodstove. Using a pellet stove, equivalent fuel cost would be $5 per 40 lb. bag, or (inconceivable for much of the world) burning shelled corn at $7 per bushel.

These cost comparisons do not include the cost of the pickup, chain saw or considerable effort and time to store the fuel and feed the stove.

9.1.5 Working Capital

Utilities typically try to reserve 60-90 days of O&M expenses and gas costs, in order to cover expenses that come up between billing cycles. The financial analysis assumes that Dinosaur would maintain a reserve account of $75,000 to serve as an emergency fund to cover O&M costs, and in case of any issues that may arise in billing.

9.1.6 Financing & Debt Repayment

This study assumes that a USDA-RD loan will be the sole source of funding, with no town funds, contributions from customers, or grants or outside help. USDA currently offers loans for such projects with 40-year term; interest-only payments for 3 years, then a 37-year amortization. The current interest rate is about 2.50% APR, which is the lowest in years. Due to the CoVid pandemic, the Fed funds rate is near zero and not expected to rise any time soon. A loan at $1.25 million at 3% APR with 37-year amortization would cost $4664 per month.

9.1.7 Financial Results

With the stated assumptions and parameters, the Base Case with 125 customers results in break-even gas rates at $13.31 per DTh (Gas Sales Data Figure 9.1.7). This is a 40% savings from propane and 20% less than electric heat. A typical 800-gallon propane user would save about $700 per year.

TOTAL GAS SALES DATA FOR THE YEAR

LINE NO.	CLASS OF SERVICE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Residential Sales	$ 99,801	$ 99,801	$ 100,661	$ 104,358	$ 103,002	$ 103,954	$ 105,013
	Gas Sales volume, DTh	7,500	7,500	8,250	9,000	9,225	9,450	9,675
	Average Number of Customers	100	100	110	120	123	126	129
2	Commercial and industrial sales	$ 39,921	$ 39,920	$ 42,705	$ 40,584	$ 44,662	$ 44,002	$ 43,416
	Gas Sales volume, DTh	3,000	3,000	3,500	3,500	4,000	4,000	4,000
	Average Number of Customers	25	25	26	26	27	27	27
3	Interdepartmental sales							
4	**Total sales to ultimate customers**	**$ 139,722**	**$ 139,721**	**$ 143,366**	**$ 144,942**	**$ 147,664**	**$ 147,956**	**$ 148,430**
5	Sales for resale							
6	Total sales of gas							
7	Other operating revenue (Monthly Service Chg)	$ 22,500	$ 22,500	$ 24,480	$ 26,280	$ 26,820	$ 27,540	$ 28,080
	Average Number of Customers	125	125	136	146	149	153	156
8	Late, connection and disconnection fees							
9								
10	**Total gas operating revenues** (1 thru 9)	**162,222**	**162,221**	**167,846**	**171,222**	**174,484**	**175,496**	**176,510**
	Total Gas Sales volume, DTh	**10,500**	**10,500**	**11,750**	**12,500**	**13,225**	**13,450**	**13,675**
	Break Even Gas Revenue	**139,722**	**139,721**	**143,366**	**144,942**	**147,664**	**147,956**	**148,430**
	'Rate /DTh	**$ 13.31**	**$ 13.31**	**$ 12.20**	**$ 11.60**	**$ 11.17**	**$ 11.00**	**$ 10.85**
	Margin over gas cost	**$ 8.81**	**$ 8.81**	**$ 7.70**	**$ 7.10**	**$ 6.67**	**$ 6.50**	**$ 6.35**
	DTh/Yr Residential	75	75	75	75	75	75	75
	DTh/Yr Commercial	120	120	120	120	120	120	120
	Monthly Service Charge	$ 15.00	$ 15.00	$ 15.00	$ 15.00	$ 15.00	$ 15.00	$ 15.00

**Gas cost at $3 index, $1.50 transport*

Figure 9.1.7: Municipal Gas Sales and Rate Projections

The rates include a monthly charge of $15.00 for all customers, before the cost of gas. This charge is similar to the cost of owning or renting a propane tank and is lower than the minimum charges for either power or telephone.

The analysis included Sensitivity of various levels of conversion and annual gas load, and the resulting rates required to cover operating expenses.

With a baseload of about 100 homes and most commercial and public buildings, the gas price is 40% less than propane. These rates are low enough that most propane users would convert their appliances to gas.

Sensitivity

Base Case utility system

# Customers	$ /DTh
100	$ 13.31
120	$ 11.91
140	$ 10.82
160	$ 9.94

Resulting rates per level of conversions
Assume 25 Commercial customers

Figure 9.1.7(a): Sensitivity Base Case

As the utility matures and more people convert, the cost to the customer will decrease, which in turn is projected to increase the number of conversions and further decrease the cost to the consumer.

Further, many all-electrics would benefit by switching their water heater, and installing a wall-mount gas heater (easy installation) to "take the edge off" their winter heating costs.

With resulting rates in this range, the gas utility appears to be very feasible.

9.1.8 Financing Water Heaters

The Base Case depends on 125 conversions, which is nearly entirely from existing propane users. An optional project could be the public financing of new water heaters as an incentive for new customers.

Sensitivity

Utility System with Water Heaters

# Customers	$/DTh	Rate Cost of Water Htr	Ave customr Cost per Yr
100	$ 13.74	*$0.43*	$ 32.25
120	$ 12.28	*$0.37*	$ 27.75
140	$ 11.15	*$0.33*	$ 24.75
160	$ 10.24	*$0.30*	$ 22.50

Figure 9.1.7(b): Sensitivity with Water Heaters

Electric water heaters, and in most cases propane units, will need to be replaced entirely at a cost of $500-750. With the ultra-low cost of USDA financing, the new utility could fund a $400-500 water

heater credit for every new conversion. This credit would encourage quicker conversion to natural gas and create a significant baseload in the summer months.
Figure 9.1.7(b) shows the modest additional cost of adding $100,000 to the project cost for 200 water heater credits. If the utility can grow more quickly to 120 or 140 homes, the resulting rate savings far outweigh the cost of the water heaters.

9.2 NWPL Charges

The NWPL charges are some of the most critical parameters for this project.

9.2.1 Demand Charges

NWPL levies a Demand charge every day of the year. Paid monthly, the demand charge is like "buying seats on the bus". It is solely based on the Maximum Daily Quantity or MDQ of gas that will likely be used on the coldest day of the year, usually around January 1, but is charged year-round.

A gas utility for small users will typically use nearly 1% of its annual load on the peak winter days, and only 2-3% of its annual load in the whole month of July. It still has to rent "seats on the bus" in the summer months, when only 1/10th of the seats are needed.

Because the pipeline has already collected a heavy toll with the Demand charge, the actual Commodity charge is minimal. The total Demand and Commodity charges on NWPL are expected to be about $1.50 per DTh.

9.2.2 Gas Costs

Although not paid directly to NWPL, the cost of gas must be a component of the final rate charged to consumers. Gas prices have fallen along with Oil prices due to oversupply and lowered demand from CoVid. The base wholesale cost of gas in this area is the Rocky Mountain Index set on NWPL at the interstate gas hub at Opal, Wyoming (near Green River). This study assumes an Index price of $3.00 per DTh, which is slightly above average for the last several years. This cost of gas also includes a small fee for the gas marketer that arranges for gas transportation on NWPL.

9.2.3 NWPL Delivery Station

By far, the most critical component and risk of this project is the cost of the NWPL delivery station. Williams has made an "Engineering and Design Proposal" in Exhibit 10. For

Williams, this is a trivial project. The existing Mainline Block Valve 4-1 or a nearby, unused above-ground appurtenance, already have several existing 2-inch valves that can be connected to supply Dinosaur.

Their proposed meter is a standard 2-inch MicroMotion Coriolis meter that any utility can buy for about $10,000. Williams has hundreds of identical installations of the simple electronic sensors and radio link to their central control facility, which might run another $10,000. NWPL will not build the regulator station to reduce pressure to Dinosaur, the utility will do that. The pipe and valves and other parts might possibly stretch another $10,000. The simple steel piping for the meter run can be assembled by any qualified welder in an afternoon.

So, given that the Town could reproduce this exact station for far less than $50,000, it is shocking to see Williams' estimate of $896,000. They helpfully state that their low range might be $639k, but their high cost might be $1.3 million. Every line item of the estimate, Materials at $150k, Engineering at $100k, Construction Contracts at $300k, is entirely fictional at 5-10-15x the actual, reasonable cost.

In comparison, the rest of the Dinosaur utility – 12 miles of pipe, 160 service lines & meters, 2 reg stations – will cost about $1 million, with thousands more components and man-hours.

Because Williams NWPL is regulated by FERC, and FERC staff only scrutinizes projects in billions of dollars, there is no interest in transactions like this. A typical NWPL connection might be a large industrial plant in Boise or Seattle that wants to bypass the local utility. The plant will use millions of cubic feet of gas and save millions of dollars per year in local charges, so the initial cost of the connection to NWPL is just a fraction of the cost of doing business.

However, in the case of a foundling Dinosaur gas utility starting with Zero customers, this Design Proposal will kill it in the crib. Williams has offered to waive the Tax Gross-up, if Dinosaur will take the negligible risk of taking ownership of the meter and paying for future upgrades. But even the $639k lowball number, less the $84k gross-up, at $555k still puts the entire project well out of reach. The project is feasible with a NWPL connection fee of $200,000 that would give Williams a healthy 75% margin.

This is irritating but reality. At the same time, the only entity that can make this project happen, also makes it impossible. This problem is not a Technical issue but a Political one. If Dinosaur wishes to pursue this project, it will need the lobbying power of Colorado's US Senators to work with FERC to negotiate a realistic, fact-based figure from Williams. Not the least of the arguments should be that NWPL should have done this in 1956.

9.3 Climate Change

The effects of Climate Change are now painfully apparent, are unrefuted by the vast majority of scientists, and will have a profound effect on the burning of carbon-based fuels like natural gas. Any new gas proposal must evaluate the potential effects of legislation and technology changes based on mitigating Climate Change. Because this topic is wide and deep, refer to our analysis Conquering Carbon; summary in Exhibit 11.

9.4 SUMMARY

The Town of Dinosaur was passed over for natural gas in 1956. Several attempts have been made to form or entice a new gas utility, and this study explores the project in greater depth than any previous attempt. The wholesale cost of natural gas vs propane or electric power, and the financing terms currently offered by USDA-RD, are more favorable than ever.

The risks are manageable, and the gas utility is viable, as long as:

- Williams NWPL is persuaded to accept a reasonable connection cost;
- The utility makes conversion as easy as possible: no-cost tap, new water heater;
- Town of Rangely can assist Town of Dinosaur in operating the system;
- Town raise awareness, identify prospects, collect deposits, to help the citizens of Dinosaur to visualize the benefits this project can offer to nearly every household;
- Last, the community can work together to reach the Base Case of 100 homes and 25 commercials as a critical target to reach viability in the first couple of years.

Attachments:

Exhibit 1:

USDA RUS Bulletin 1780-2
GENERAL OUTLINE OF A PRELIMINARY ENGINEERING REPORT (PER)

1) PROJECT PLANNING
- a) Location
- b) Environmental Resources Present
- c) Population Trends
- d) Community Engagement

2) EXISTING FACILITIES
- a) Location Map
- b) History
- c) Condition of Existing Facilities
- d) Financial Status of any Existing Facilities
- e) Water/Energy/Waste Audits

3) NEED FOR PROJECT
- a) Health, Sanitation, and Security
- b) Aging Infrastructure
- c) Reasonable Growth

4) ALTERNATIVES CONSIDERED
- a) Description
- b) Design Criteria
- c) Map
- d) Environmental Impacts
- e) Land Requirements
- f) Potential Construction Problems
- g) Sustainability Considerations
    - i) Water and Energy Efficiency
    - ii) Green Infrastructure
    - iii) Other
- h) Cost Estimates

5) SELECTION OF AN ALTERNATIVE
- a) Life Cycle Cost Analysis
- b) Non-Monetary Factors

6) PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)
- a) Preliminary Project Design

b) Project Schedule
c) Permit Requirements
d) Sustainability Considerations
    i) Water and Energy Efficiency
    ii) Green Infrastructure
    iii) Other
e) Total Project Cost Estimate (Engineer's Opinion of Probable Cost)
f) Annual Operating Budget
    i) Income
    ii) Annual O&M Costs
    iii) Debt Repayments
    iv) Reserves

7) CONCLUSIONS AND RECOMMENDATIONS
(Bulletin has expanded explanations of each bullet point)

Exhibit 2: Rangely O&M Proposal

Steve Shute

From: Kelli Neiberger <kneiberger@rangelyco.gov>
Sent: Wednesday, September 16, 2020 2:42 PM
To: Steve Shute
Cc: Lisa Piering
Subject: RE: Dinosaur Gas

Steve,

I have worked out some numbers for you. This is a new and unique situation for us so we are open to any questions or discussions you may wish to have in regards to the amounts we have come up with. When we factor in benefits, tools and equipment, this is what we have. We would charge an hourly rate of $50.00 per hour. This would include a gas utility technician with their utility truck and related tools. So, a daily rate (8hrs. a day at $50.00 per hour) would be $400.00. For the all-in cost of our average gas person we have come up with $80,000 per year. So, at 40-50% FTE that would be $32,000 - $40,000.

If you would like I could come up with a price per foot for service installation if the materials were provided. Until you have a better idea of how long the services would be this may not be very useful to you.

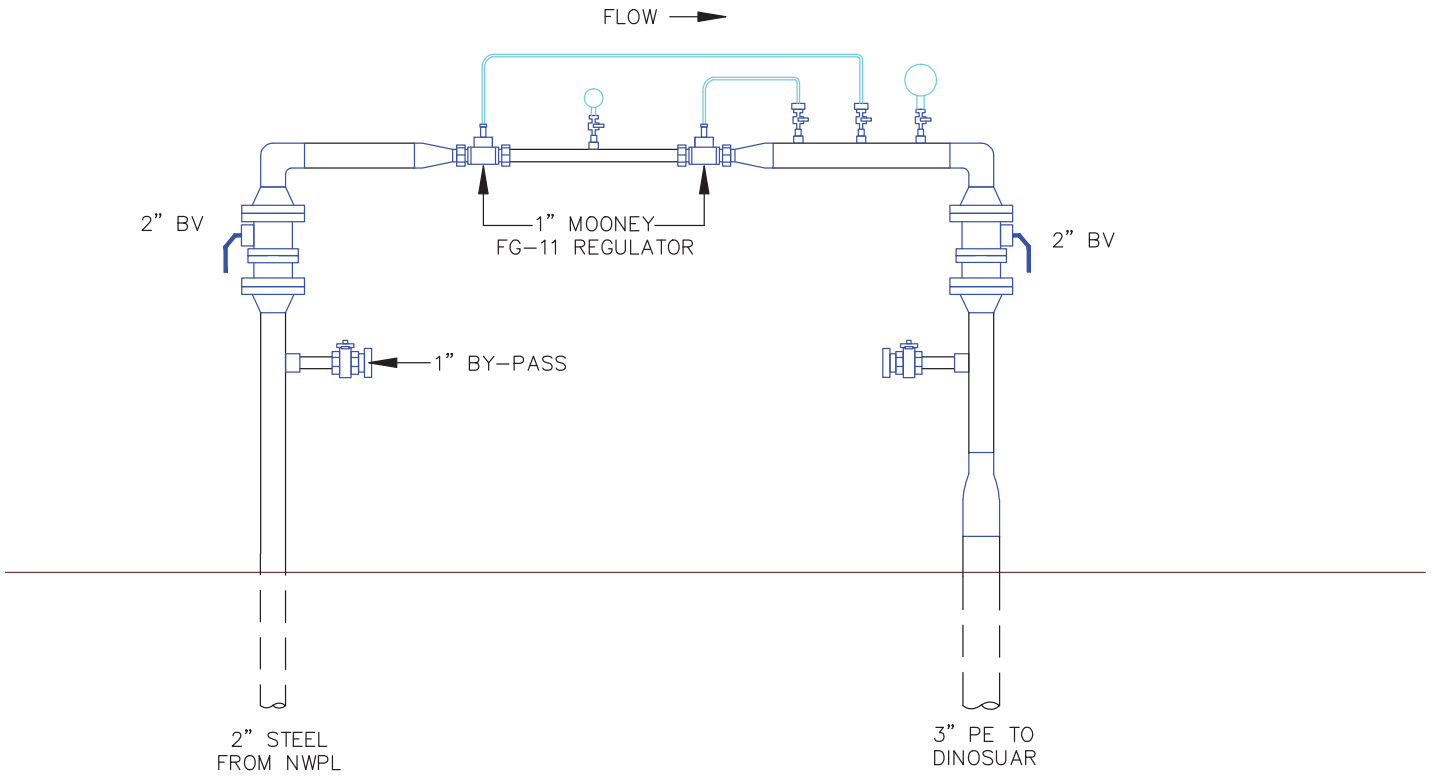
We would be happy to go over to Dinosaur and meet with their Town representatives and be available for a public meeting if we need to. I just don't know whether we should do that now or wait until you have submitted your draft and we have a better idea what the chances are of this project moving forward.

We are still very excited to work with you and assist in any way we can. If you have questions about other tools and equipment you might need feel free to ask. Let me know if you need anything else.

Thank you,

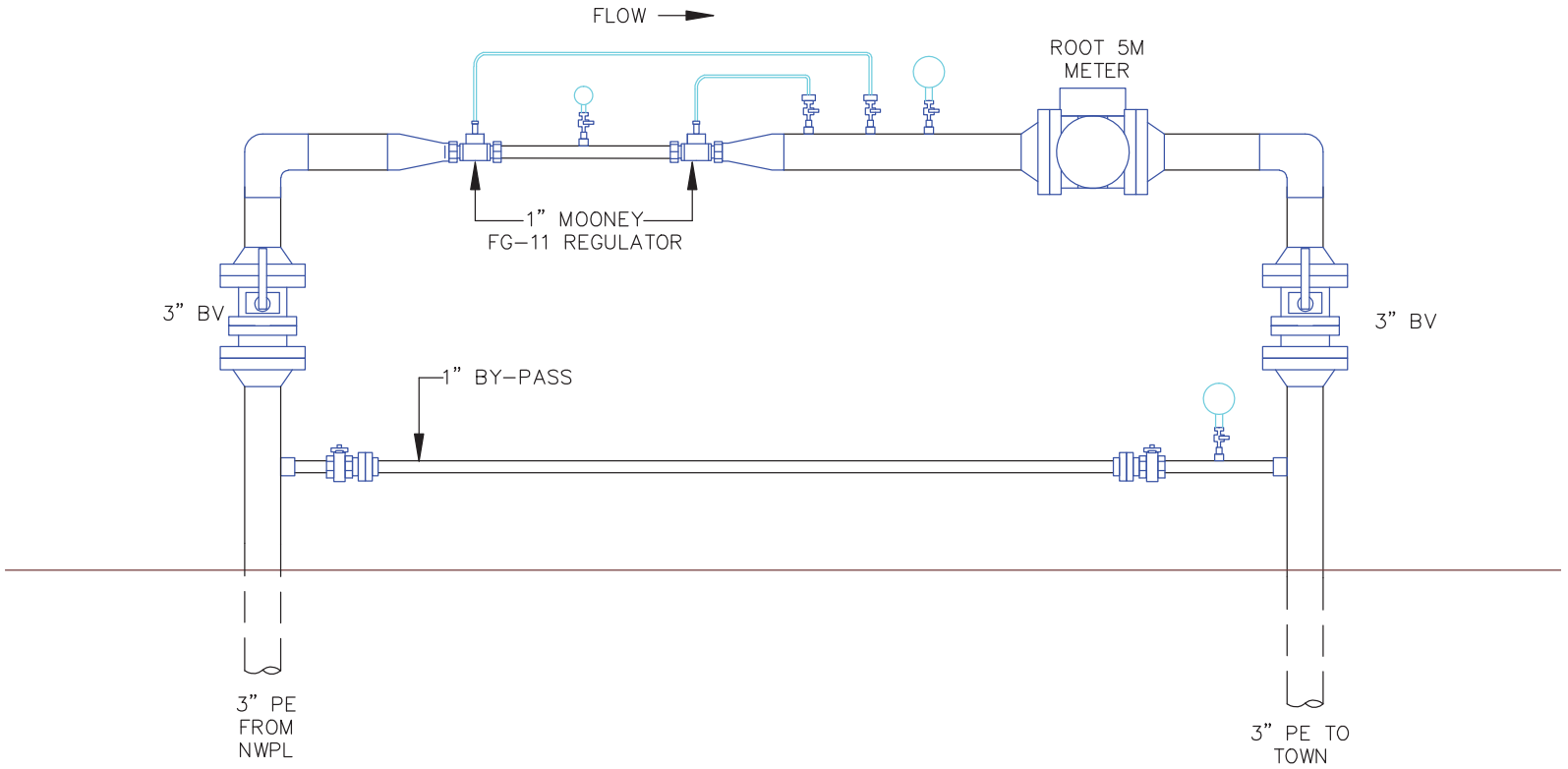
Kelli Neiberger
Town of Rangely
Gas Department Supervisor
Cell: (970)629-0776
Office: (970)675-8258

Exhibit 3: NWPL Reg Station and Town Border Station Drawings (1 of 2)



DINOSAUR GAS		
NWPL REGULATOR STATION Uintah County, UTAH		
Scale: 1/8"=1'-0"	● 'B' SIZE PAPER	Sheet of
Drawn By: M.J.M.	Date:10-28-2020	Dwg.No.

Exhibit 3: NWPL Reg Station and Town Border Station Drawings (2 of 2)



DINOSAUR GAS		
TOWN BORDER STATION TOWN OF DINOSUAR MOFFAT, COUNTY		
Scale: 1/8"=1'-0"	● 'B' SIZE PAPER	Sheet of
Drawn By: M.J.M.	Date:10-28-2020	Dwg.No.

Exhibit 4: Standard Meter and Service Line Drawing

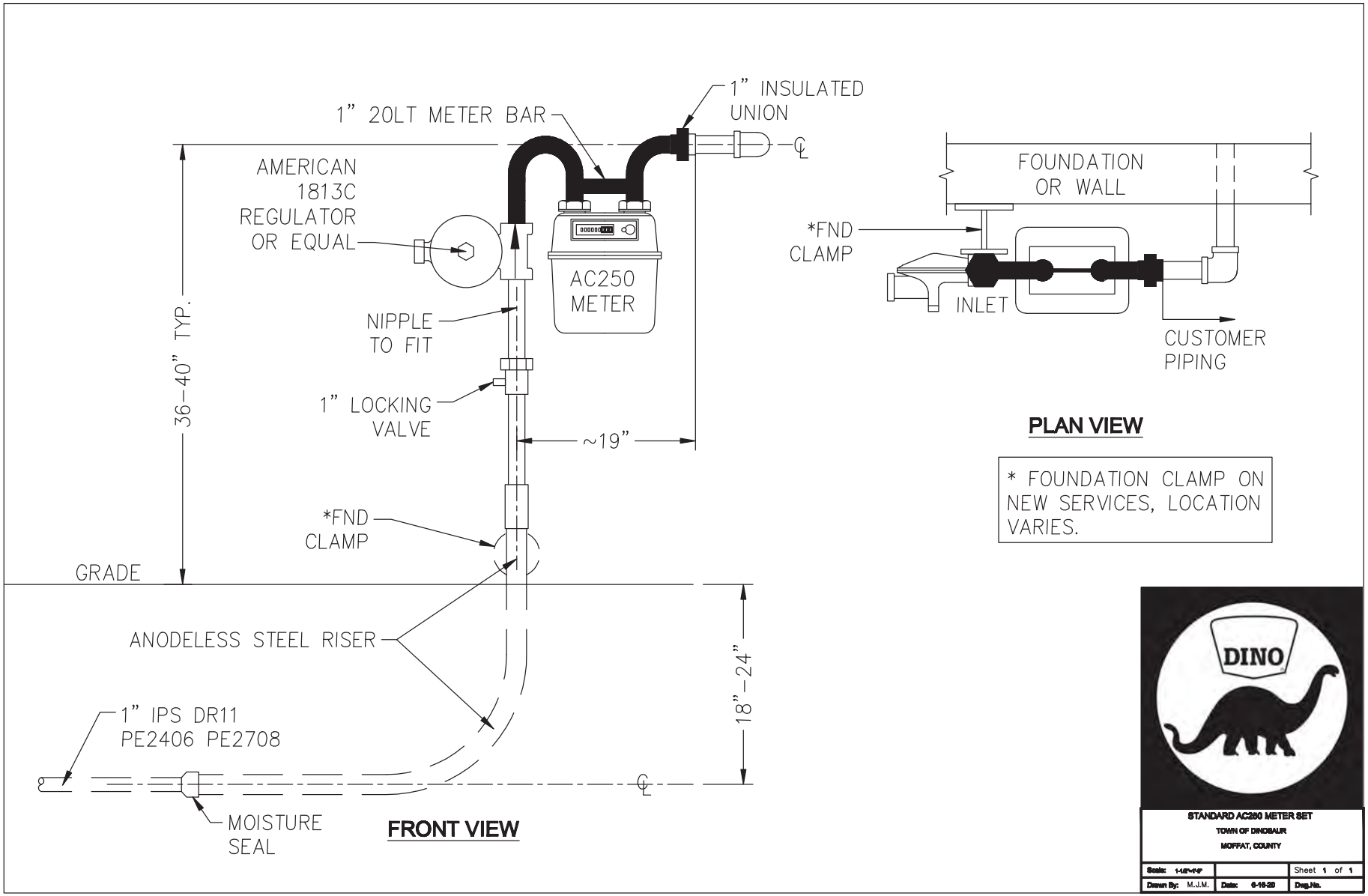


Exhibit 5: Municipal Operations and Maintenance Cost

Annual Report of **Dinosaur Gas** Year Ended December 31, **2021**

GAS OPERATION AND MAINTENANCE EXPENSES

LINE NO.	CLASS OF SERVICE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1	Production expenses:							
2	Manufactured gas production (submit schedule)							
3	Natural gas production and gathering:							
4	Products extraction							
5	Exploration and development							
6	Other gas supply expenses:							
7	Natural gas purchases	47,250	47,250	52,875	56,250	59,513	60,525	61,538
8	Other gas purchases							
9	Purchased gas expenses							
10	Gas withdrawn from underground storage - Dr.							
11	Gas delivered to underground storage - Cr.							
12	Gas used in utility operations							
13	Miscellaneous gas supply expenses	5,000	5,000	5,000	5,000	5,000	5,000	5,000
14	Total other gas supply expenses (7 thru 13)	**52,250**	**52,250**	**57,875**	**61,250**	**64,513**	**65,525**	**66,538**
15	Total production expenses (2+4+5+14)	**52,250**	**52,250**	**57,875**	**61,250**	**64,513**	**65,525**	**66,538**
16	Storage expenses (submit schedule by accounts)							
17	Transmission expenses							
18	Distribution expenses (Rangely contract)	32,000	32,000	32,000	32,000	32,000	32,000	32,000
19	Customer accounts expenses (Town billing)	12,000	12,000	12,000	12,000	12,000	12,000	12,000
20	Customer services (Town ops)	5,000	5,000	5,000	5,000	5,000	5,000	5,000
21	Sales expenses							
22	Administrative and general expenses	5,000	5,000	5,000	5,000	5,000	5,000	5,000
23	Total gas operation and maintenance expenses (15+(16 thru 22))	**106,250**	**106,250**	**111,875**	**115,250**	**118,513**	**119,525**	**120,538**

Exhibit 6: Municipal Balance Sheets - Assets & Liabilities (1 of 2)

Annual Report of

Year Ended December 31, **2021**

COMPARATIVE BALANCE SHEET

LINE NO.	ASSETS AND OTHER DEBITS	BALANCE END OF YEAR
1	Utility plant (101) (less accumulated provision for deprec	1,000,000
2	Gas Stored Underground - non-current (117)	
3	Other Utility Plant Adjustments (114, 118)	200,000
4	Non-utility property adjustments (121) (less accumulated provision for depreciation, depletion and amortization (122)	
5	Other Investments and special funds (124, 128)	
6	Current and accrued assets:	
7	Cash and working funds (130)	50,000
8	Temporary cash investments (136)	
9	Notes and accounts receivables (141, 142, 143) (less accumulated provision for uncollectible accounts (144)	
10	Materials and supplies (154)	
11	Gas stored underground - current (164.1)	
12	Prepayments (165)	16,000
13	Other current assets (174)	
14	Total current and accrued assets (7 thru 13)	66,000
15	Unamortized debt expense (181)	
16	Extraordinary property losses (182.1)	
17	Other deferred debits (186)	
18	Def. losses from dispostion of utility plant (187)	
19	Unamortized loss on reacquired debt (189)	
20	Unrecovered purchased gas costs (191)	
21	Due from other funds	
22		
23		
24		
25		
26		
27		
28	Total assets and other debits ((1 thru 5)+14+(15 thru 27))	**1,266,000**

Exhibit 6: Municipal Balance Sheets - Assets & Liabilities (2 of 2)

Annual Report of **Dinosaur Gas** Year Ended December 31, **2021**

COMPARATIVE BALANCE SHEET - Continued

LINE NO.	LIABILITIES AND OTHER CREDITS	BALANCE END OF YEAR
1	Other Paid in Capital (211)	
2	Retained Earnings (215, 216)	
3	Total Capital (1+2)	-
4	Bonds (221)	
5	Other long-term debt (224) (specify in footnote)	1,194,048
6	Unamortized premium on long-term debt (225)	
7	Unamortized premium on long-term debt - Dr(226)	
8	Total long-term debt (4 thru 7)	**1,194,048**
9	Current and accrued liabilities:	
10	Notes and accounts payable (231, 232)	55,952
11	Customer deposits (235)	16,000
12	Interest accrued (237)	
13	Other current and accrued liabilities (242)	
14	Total current and accrued liabilities (10 thru 13)	**71,952**
15	Customer advances for construction (252)	
16	Other deferred credits (253)	
17	Deferred gains from disposal of utilitiy plant (256)	
18	Unamortized gain on reacquired debt (257)	
19	Operating reserves	
20	Total liabilities and other credits (3+8+14+(15 thru 19))	**1,266,000**

Exhibit 7 : Municipal Income Statement

Annual Report of **Dinosaur Gas** Year Ended December 31, **2021**

LINE NO.	ACCOUNT	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	STATEMENT OF INCOME FOR THE YEAR							
1	OPERATING INCOME							
2	Operating revenues (400)	162,222	162,221	167,846	171,222	174,484	175,496	176,510
3	Operating expenses:							
4	Operation expense (401)	106,250	106,250	111,875	115,250	118,513	119,525	120,538
5	Maintenance expense (402)							
6	Depreciation expense (403) (Principle Payments)	18,728	19,297	19,884	20,489	21,112	21,754	22,416
7	Amortization expense (specify by account)							
8	Transfer to general fund							
9								
10								
11	Taxes other than income taxes (408.1)							
12	Gains from disposition of utility plant (411.6)							
13	Losses from disposition of utility plant (411.7)							
14	**Total utility operating expenses (4 thru 13)**	**124,978**	**125,547**	**131,759**	**135,739**	**139,625**	**141,279**	**142,954**
15	**Net utility operating income (2-14)**	**37,244**	**36,674**	**36,087**	**35,483**	**34,859**	**34,217**	**33,556**
16	OTHER INCOME AND DEDUCTIONS							
17	Other income							
18	Non-utility operating income (415 - 418)							
19	Interest and dividend income (419)							
20	Allowance for other funds used during construction (419.1)							
21	Miscellaneous non-operating income (421)							
22	Gain on disposition of property (421.1)							
23	**Total other income (18 thru 22)**	-	-	-	-	-	-	-
24	Other income deductions:							
25	Loss on disposition of property (421.1)							
26	Miscellaneous amortization (425)							
27	Miscellaneous income deductions (426.1 - 426.5)							
28	Total other income deductions (25 thru 27)	-	-	-	-	-	-	-
29	Taxes other than income taxes (408.2)							
30	**Net other income and deductions (23-28-29)**	-	-	-	-	-	-	-
31	INTEREST CHARGES							
32	Interest on long-term debt (427)	37,244	36,674	36,087	35,483	34,859	34,217	33,556
33	Amortization of debt discount and expenses (428)							
34	Amortization of loss on reacquired debt (428.1)							
35	Amortization of premium on debt - Cr. (429)							
36	Amortization of gain on reacquired debt - Cr. (429.1)							
37	Other interest expense (431) - Finance Water Heaters							
38	Allowance for borrowed funds used during construction - Cr. (432)							
39	Net interest charges (32 thru 38)	**37,244**	**36,674**	**36,087**	**35,483**	**34,859**	**34,217**	**33,556**
40	**Income before extraordinary items (15+30-39)**	-	-	-	-	-	-	-
41	EXTRAORDINARY ITEMS							
42	Extraordinary income (434)							
43	Extraordinary deductions (435)							
44	**Net extraordinary items (42-43)**	-	-	-	-	-	-	-
45	**Net Income (40+44)**	-	-	-	-	-	-	-

Exhibit 8: Cost of Standard Service line

Dinosaur Natural Gas *Cost of typical Service Line*

	Qty	Unit cost	Total per SL	Notes	MISC Notes
Meter Set & Service Misc.					
2"x1" Electrofusion Tapping Saddle	1	$21.00	$ 21.00	P/N: 360001278; Tap tee	Prices quoted Jul20 by Scott @ Mtn States Pipe
1" Electrofusion Coupling	3	$ 9.00	$ 27.00	P/N: 36000893; out of Tap, both ends EFV; riser; more on some projects	
1" Excess Flow Valve	1	$13.00	$ 13.00	P/N: 50093GB for UMAC 700 #41	
1"x36" anodeless PE Riser	1	$39.00	$ 39.00	P/N: MTNSS070070H is 36"V x 30"H	
1" Mueller meter stop, union top	1	$35.00	$ 35.00	P/N: H111791; 1x1 NPT valve with union top; 175 PSIG;	Union top is $11 more; saves fittings & makeup time
1"x6" pipe Nipple	1	$ 3.50	$ 3.50	P/N: 16BN, Black Iron, NPT	
1"x1" Elster Regulator w/base	1	$36.00	$ 36.00	P/N: RS1813C-3; 1x1 NPT; 5.5-8.5" WC; 3/16" orifice	last order Apr20 was $36; MSPS quote $54.45 seems erroneous
1" pre-fabricated meter Loop	1	$55.00	$ 55.00	P/N: MBB1-BBABA-DA-U; 1" NPT x 20LT spuds; in lieu of	last order Apr20 was $49.13, GF Central Plastics
Meter Bracket to fix to foundation	1	$21.00	$ 21.00	P/N: T-41 round bracket	
American AC250 Meter	1	$95.00	$ 95.00	P/N: AC250 with TC, odometer index, 20LT spuds	
Itron ERT radio	1	$62.00	$ 62.00	P/N: ERG-5007-001	
1-inch PE SDR11 Pipe - ave footage	65	$ 0.35	$ 22.75	typical in-town service line length	
#12 AWG solid copper tracer wire	69	$ 0.16	$ 11.04	^add 4 ft for tie-in at main, plus loop to surface by riser	
Tracer wire splice	1	$ 5.00	$ 5.00	underground splice kit with sealant	
			$ 446.29	**Materials**	
**sized for typical residential load*					
			$ 340.00	**Labor & Equipt**	
				2 laborers, 1 truck & tools at $85 /hr or $680 per day	
				Plow Trencher is $200 /day, recommend buying or leasing the trencher	
			$ 786.29	**Total Service - average length**	

Doug prepared original for Dinosaur project estimate ca Dec14

208	Total Services	**41**	Services over 100 ft	
100	ft	**7282**	Excess footage	
$790	Ave Cost	**$2.5**	Excess $/ft	
				Total Cost
$164,320		**$18,205**		**$182,525**

$9.21 average $/ft for all of them

1" Insulated Union	1	$ 9.20	$ 9.20	P/N: 1005102, Black Iron, NPT; or use insulated Valve	add if not built into Meter Stop and Meter Loop

Exhibit 9: Historical Gas Cost Comparison Sheet (1 of 2)

Wendover Gas
Historic Cost - Propane v Natural Gas

	Propane	Propane	Natl Gas	Differential PvsNG		Monthly	Weighted	Annual	Quarterly	Propane	Diff'l	Diff'l	Crude Oil	$ BTU
	cost / gallon wholesale	*$ per Dth*	*$ per Dth Opal index*	*$ per Dth*	*%*	**Weight**	*d$ per Dth*	**Wtd Ave d$**	**Wtd Ave d$**	*MtBelvu $/gl*	*v Opal $/DTh*	*Wen vs Blvu $/DTh*	*NYMex $/bbl* EoM	*WenC3 v Oil*
													gal vs bbl	*63.74*
Jan-14	*1.750*	19.13	4.36	14.77	*339%*	*15.5%*	2.29			1.398	*11.00*	3.87	97.49	*14%*
Feb-14	*1.940*	21.20	4.96	16.24	*327%*	*13.5%*	2.19			1.452	*11.00*	5.36	102.59	*21%*
Mar-14	*1.210*	13.22	5.31	7.91	*149%*	*11.0%*	0.87		13.38	1.060	*6.34*	1.65	101.58	*-24%*
Apr-14	*1.100*	12.02	4.32	7.70	*178%*	*8.5%*	0.65			1.099	*7.75*	0.01	99.74	*-30%*
May-14	*1.060*	11.58	4.45	7.13	*160%*	*6.0%*	0.43			1.041	*6.99*	0.21	102.71	*-34%*
Jun-14	*1.090*	11.91	4.23	7.68	*182%*	*3.0%*	0.23		7.50	1.045	*7.25*	0.50	105.37	*-34%*
Jul-14	*1.094*	11.96	4.42	7.54	*171%*	*2.0%*	0.15			1.034	*6.94*	0.66	98.17	*-29%*
Aug-14	*1.097*	11.99	3.69	8.30	*225%*	*2.0%*	0.17			1.016	*7.47*	0.89	95.96	*-27%*
Sep-14	*1.123*	12.27	3.83	8.44	*220%*	*3.0%*	0.25		8.14	1.061	*7.83*	0.68	91.16	*-21%*
Oct-14	*1.089*	11.90	3.77	8.13	*216%*	*7.5%*	0.61			0.936	*6.52*	1.68	80.54	*-14%*
Nov-14	*1.041*	11.38	3.42	7.96	*233%*	*11.5%*	0.92			0.804	*5.41*	2.61	66.15	*0%*
Dec-14	*0.870*	9.51	4.09	5.42	*132%*	*16.5%*	0.89	9.65	6.81	0.546	*1.91*	3.56	53.27	*4%*
Jan-15	*0.726*	7.93	3.09	4.84	*157%*	*15.5%*	0.75			0.478	*2.16*	2.73	48.24	*-4%*
Feb-15	*0.716*	7.83	2.65	5.18	*195%*	*13.5%*	0.70			0.572	*3.64*	1.58	49.76	*-8%*
Mar-15	*0.684*	7.48	2.62	4.86	*185%*	*11.0%*	0.53		4.96	0.544	*3.36*	1.54	47.60	*-8%*
Apr-15	*0.584*	6.38	2.30	4.08	*178%*	*8.5%*	0.35			0.546	*3.70*	0.42	59.63	*-38%*
May-15	*0.434*	4.74	2.24	2.50	*112%*	*6.0%*	0.15			0.456	*2.77*	(0.24)	60.30	*-54%*
Jun-15	*0.454*	4.96	2.60	2.36	*91%*	*3.0%*	0.07		3.25	0.365	*1.41*	0.98	59.47	*-51%*
Jul-15	*0.424*	4.63	2.62	2.01	*77%*	*2.0%*	0.04			0.385	*1.61*	0.43	47.12	*-43%*
Aug-15	*0.424*	4.63	2.66	1.97	*74%*	*2.0%*	0.04			0.374	*1.45*	0.55	49.20	*-45%*
Sep-15	*0.509*	5.56	2.46	3.10	*126%*	*3.0%*	0.09		2.47	0.453	*2.51*	0.62	45.09	*-28%*
Oct-15	*0.604*	6.60	2.43	4.17	*172%*	*7.5%*	0.31			0.445	*2.46*	1.74	46.59	*-17%*
Nov-15	*0.584*	6.38	2.04	4.34	*213%*	*11.5%*	0.50			0.423	*2.60*	1.77	41.65	*-11%*
Dec-15	*0.609*	6.66	2.22	4.44	*200%*	*16.5%*	0.73	4.27	4.35	0.380	*1.96*	2.52	37.04	*5%*
Jan-16	*0.594*	6.49	2.28	4.21	*185%*	*15.5%*	0.65			0.330	*1.35*	2.90	33.62	*13%*
Feb-16	*0.554*	6.05	2.02	4.03	*200%*	*13.5%*	0.54			0.374	*2.09*	1.98	33.75	*5%*
Mar-16	*0.554*	6.05	1.51	4.54	*301%*	*11.0%*	0.50		4.24	0.451	*3.45*	1.13	38.34	*-8%*
Apr-16	*0.544*	5.95	1.51	4.44	*294%*	*8.5%*	0.38			0.455	*3.49*	0.98	45.92	*-24%*
May-16	*0.629*	6.87	1.77	5.10	*288%*	*6.0%*	0.31			0.527	*4.02*	1.12	49.10	*-18%*
Jun-16	*0.554*	6.05	1.78	4.27	*240%*	*3.0%*	0.13		4.64	0.497	*3.68*	0.63	48.33	*-27%*
Jul-16	*0.539*	5.89	2.52	3.37	*134%*	*2.0%*	0.07			0.472	*2.66*	0.74	41.60	*-17%*
Aug-16	*0.524*	5.73	2.51	3.22	*128%*	*2.0%*	0.06			0.444	*2.37*	0.87	44.70	*-25%*
Sep-16	*0.554*	6.05	2.62	3.43	*131%*	*3.0%*	0.10		3.35	0.497	*2.84*	0.63	48.24	*-27%*
Oct-16	*0.704*	7.69	2.70	4.99	*185%*	*7.5%*	0.37			0.578	*3.65*	1.39	46.86	*-4%*
Nov-16	*0.668*	7.30	2.62	4.68	*179%*	*11.5%*	0.54			0.529	*3.19*	1.53	49.44	*-14%*
Dec-16	*0.839*	9.17	2.99	6.18	*207%*	*16.5%*	1.02	4.68	5.44	0.633	*3.96*	2.27	53.72	*0%*
Jan-17	*0.994*	10.86	3.73	7.13	*191%*	*15.5%*	1.11			0.740	*4.40*	2.79	52.81	*20%*
Feb-17	*0.973*	10.63	3.11	7.52	*242%*	*13.5%*	1.02			0.786	*5.52*	2.06	54.01	*15%*
Mar-17	*0.770*	8.42	2.29	6.13	*267%*	*11.0%*	0.67		6.99	0.611	*4.42*	1.75	50.60	*-3%*
Apr-17	*0.726*	7.93	2.64	5.29	*201%*	*8.5%*	0.45			0.650	*4.51*	0.83	49.33	*-6%*
May-17	*0.699*	7.64	2.62	5.02	*192%*	*6.0%*	0.30			0.640	*4.41*	0.65	48.32	*-8%*
Jun-17	*0.653*	7.14	2.79	4.35	*156%*	*3.0%*	0.13		5.04	0.591	*3.70*	0.69	46.04	*-10%*

Exhibit 9: Historical Gas Cost Comparison Sheets (2 of 2)

Wendover Gas
Historic Cost - Propane v Natural Gas

	Propane	Propane	Natl Gas	Differential PvsNG		Monthly	Weighted	Annual	Quarterly	Propane	Diff'l	Diff'l	Crude Oil	$ BTU
	cost / gallon wholesale	*$ per Dth*	*$ per Dth Opal index*	*$ per Dth*	*%*	**Weight**	*d$ per Dth*	**Wtd Ave d$**	**Wtd Ave d$**	*MtBelvu $/gl*	*v Opal $/DTh*	*Wen vs Blvu $/DTh*	*NYMex $/bbl* EoM	*WenC3 v Oil*
													gal vs bbl	*63.74*
Jul-17	*0.720*	7.87	2.63	5.24	*199%*	*2.0%*	0.10			0.655	*4.57*	0.71	50.17	*-9%*
Aug-17	*0.820*	8.96	2.59	6.37	*246%*	*2.0%*	0.13			0.760	*5.76*	0.66	47.23	*11%*
Sep-17	*0.927*	10.13	2.59	7.54	*291%*	*3.0%*	0.23		6.55	0.889	*7.18*	0.42	51.67	*14%*
Oct-17	*1.060*	11.58	2.48	9.10	*367%*	*7.5%*	0.68			0.932	*7.76*	1.41	54.38	*24%*
Nov-17	*1.151*	12.58	2.63	9.95	*378%*	*11.5%*	1.14			0.976	*8.09*	1.93	57.40	*28%*
Dec-17	*1.200*	13.11	2.73	10.38	*380%*	*16.5%*	1.71	7.68	9.97	0.959	*7.81*	2.64	60.42	*27%*
Jan-18	*1.131*	12.36	2.52	9.84	*391%*	*15.5%*	1.53			0.903	*7.40*	2.51	64.73	*11%*
Feb-18	*1.042*	11.39	2.80	8.59	*307%*	*13.5%*	1.16			0.876	*6.82*	1.83	61.64	*8%*
Mar-18	*1.008*	11.02	2.18	8.84	*406%*	*11.0%*	0.97		9.14	0.781	*6.41*	2.49	64.94	*-1%*
Apr-18	*0.882*	9.64	1.85	7.79	*421%*	*8.5%*	0.66			0.821	*7.17*	0.68	68.57	*-18%*
May-18	*0.950*	10.38	1.90	8.48	*446%*	*6.0%*	0.51			0.920	*8.21*	0.33	67.04	*-10%*
Jun-18	*0.935*	10.22	2.09	8.13	*389%*	*3.0%*	0.24		8.09	0.881	*7.59*	0.59	74.15	*-20%*
Jul-18	*0.982*	10.73	2.24	8.49	*379%*	*2.0%*	0.17			0.942	*8.11*	0.44	68.76	*-9%*
Aug-18	*0.970*	10.60	2.41	8.19	*340%*	*2.0%*	0.16			0.978	*8.34*	(0.09)	69.80	*-11%*
Sep-18	*1.012*	11.06	2.32	8.74	*377%*	*3.0%*	0.26		8.51	1.059	*9.31*	(0.51)	73.25	*-12%*
Oct-18	*1.080*	11.80	2.32	9.48	*409%*	*7.5%*	0.71			0.957	*8.19*	1.36	65.31	*5%*
Nov-18	*0.931*	10.17	3.23	6.94	*215%*	*11.5%*	0.80			0.744	*4.94*	2.06	50.93	*17%*
Dec-18	*0.987*	10.79	5.70	5.09	*89%*	*16.5%*	0.84	8.02	6.62	0.671	*1.67*	3.47	45.41	*39%*
Jan-19	*0.982*	10.73	4.22	6.51	*154%*	*15.5%*	1.01			0.659	*3.02*	3.55	53.79	*16%*
Feb-19	*0.982*	10.73	3.38	7.35	*218%*	*13.5%*	0.99			0.667	*3.95*	3.46	57.22	*9%*
Mar-19	*0.938*	10.25	3.77	6.48	*172%*	*11.0%*	0.71		6.79	0.661	*3.49*	3.05	60.14	*-1%*
Apr-19	*0.730*	7.98	2.48	5.50	*222%*	*8.5%*	0.47			0.628	*4.42*	1.12	63.91	*-27%*
May-19	*0.632*	6.91	1.88	5.03	*267%*	*6.0%*	0.30			0.570	*4.39*	0.68	53.50	*-25%*
Jun-19	*0.550*	6.01	1.89	4.12	*218%*	*3.0%*	0.12		5.10	0.429	*2.82*	1.33	58.47	*-40%*
Jul-19	*0.534*	5.84	1.92	3.92	*204%*	*2.0%*	0.08			0.438	*2.89*	1.06	58.58	*-42%*
Aug-19	*0.485*	5.30	2.01	3.29	*164%*	*2.0%*	0.07			0.419	*2.60*	0.72	55.10	*-44%*
Sep-19	*0.537*	5.87	1.81	4.06	*224%*	*3.0%*	0.12		3.80	0.450	*3.13*	0.96	54.07	*-37%*
Oct-19	*0.618*	6.75	2.01	4.74	*236%*	*7.5%*	0.36			0.461	*3.06*	1.72	54.18	*-27%*
Nov-19	*0.735*	8.03	2.32	5.71	*246%*	*11.5%*	0.66			0.535	*3.56*	2.19	55.17	*-15%*
Dec-19	*0.772*	8.44	3.44	5.00	*145%*	*16.5%*	0.82	5.71	5.18	0.495	*2.00*	3.04	61.06	*-19%*
Jan-20	*0.659*	7.20	3.16	4.04	*128%*	*15.5%*	0.63			0.400	*1.23*	2.85	51.56	*-19%*
Feb-20	*0.607*	6.63	1.95	4.68	*240%*	*13.5%*	0.63			0.392	*2.36*	2.36	44.76	*-14%*
Mar-20	*0.557*	6.09	1.54	4.55	*295%*	*11.0%*	0.50		4.40	0.322	*2.00*	2.58	20.48	*73%*
Apr-20	*0.424*	4.63	1.29	3.34	*259%*	*8.5%*	0.28			0.322	*2.25*	1.12	19.56	*38%*
May-20	*0.495*	5.41	1.59	3.82	*240%*	*6.0%*	0.23			0.407	*2.89*	0.96	35.49	*-11%*
Jun-20	*0.580*	6.34	1.54	4.80	*312%*	*3.0%*	0.14	4.52	3.76	0.492	*3.87*	0.97	39.27	*-6%*
Jul-20	*0.594*	6.49	1.53	4.96	*324%*	*2.0%*	0.10			0.494	*3.90*	1.09	10.27	*269%*
Aug-20	*0.619*	6.77	1.69	5.08	*300%*	*2.0%*	0.10			0.520	*4.02*	1.09	43.20	*-9%*
Sep-20	*0.614*	6.71	2.39	4.32	*181%*	*3.0%*	0.13		4.72					

Exhibit 10: Williams NWPL "Engineering and Design Proposal"

CONCEPTUAL DESIGN – SUBJECT TO CHANGE
FRONT END ENGINEERING & DESIGN PROPOSAL
Town of Dinosaur Delivery Meter Station
near NWP Mainline M.P. 295
Rio Blanco County, CO

1. PRELIMINARY SCOPE

1.1. EXECUTIVE SUMMARY

Town of Dinosaur has requested a cost estimate for a new interconnect on Northwest Pipeline's ("Northwest's") Mainline near M.P. 295 in Rio Blanco County, CO. Per the Interconnect Request Form completed by Town of Dinosaur on July 28 2020, the cost estimate includes the required facilities to deliver volumes shown in the table below.

Please note if flows are observed below the design minimum delivery rate, measurement equipment may be added at additional cost to Town of Dinosaur. Northwest will deliver gas at prevailing line pressure, up to the MAOP of 809 psig. Town of Dinosaur is responsible for regulation and overpressure protection.

	Hourly Rate (MSCFH)	Daily Rate (MSCFD)	Daily Rate with 1.54 Peaking Factor (MSCFD)	Design Min Rate (MSCFD)
Proposed Capacity	8	192	125	8

The design delivery pressure is 450 psig. Please note design pressure does not imply a guarantee of pressure during service.

IN-SERVICE

The requested in-service date is September 15, 2021. This date is dependent upon the approval of a facilities agreement by December 15, 2020. The estimate assumes 9 months for planning, permitting, and construction from agreement execution and funding through in-service. Expediting the project may significantly impact project cost. Construction during the winter/wet season also may significantly impact project cost and schedule.

The major items included in this estimate are:

- Utilize existing tap on NWP Mainline
- CMFS040 2/5" Coriolis
- 2" Dry Gas Filter
- EFM Enclosure
- EFM & SCADA communication equipment
- 2" yard piping and 2" meter bypass

ESTIMATE

The estimate presented here is considered Class 4. A Class 4 classification indicates a high-level facility design with general review and input from project stakeholders. It is derived from limited information and past project costs, and is intended for feasibility analysis.

The Class 4 estimated direct cost for the facilities as briefly described above is shown below.

	Percent	Estimate	Low Estimate	High Estimate	Comments
Project Management	4%	$ 27,000	$ 13,000	$ 39,000	Range of estimates based on historical meter station data from 2019 Costs can vary based on complexity of project, changes in scope, compressed time frame, delays and other issues. The high estimate includes costs for outsourcing project management, which would only occur if internal employees were assigned to other projects due to heavy work load.
Engineering	14%	$ 104,000	$ 71,000	$ 150,000	Range of estimates based on historical meter station data from years 2019. Costs can vary based on complexity of project, changes in scope, compressed time frame, delays and other issues.
Materials	21%	$ 162,000	$ 103,000	$ 202,000	Based on estimates from venders and historical data.
Construction Support	7%	$ 50,000	$ 38,000	$ 72,000	Range based on the anticipated length of construction of 9 weeks. Construction delays or complications will increase costs.
Construction Contracts	42%	$ 322,000	$ 258,000	$ 484,000	Range of estimates based on historical meter station data from years 2019. Historical costs used in estimate may not be representative of current market conditions. Depending on the time of year costs may be higher than estimated. If winter construction is required costs could be approximately 30% higher.
Land	3%	$ 26,000	$ 17,000	$ 38,000	
Natural Resources	1%	$ 7,000	$ 2,000	$ 9,000	Costs will vary depending on the location and permits required. Additional cultural or biological surveys may be required that will increase the costs.
Environmental	2%	$ 16,000	$ 16,000	$ 5,000	
MISC Labor	0%	$ 1,000	$ 1,000	$ 5,000	
Operations	6%	$ 46,000	$ 24,000	$ 70,000	Estimate is based on the approximate number of hours to complete the project. Costs will increase if construction takes longer than anticipated.
Total Direct Cost	100%	$ 761,000	$ 543,000	$ 1,074,000	
AFUDC		$ -	$ -	$ -	
A&G		$ 17,000	$ 12,000	$ 24,000	Assumes a 2020 overhead rate of 2.25%
Tax Gross up		$ 118,000	$ 84,000	$ 166,000	Estimate assumes a 2020 tax rate of 15.16%. If the Williams corporate tax rate changes, the estimate will be adjusted accordingly.
Total Cost		$ 896,000	$ 639,000	$ 1,264,000	

1.2 FACILITY DESCRIPTION

1.2.1 LOCATION

The tentative location for the interconnect is at Northwest's Mainline, near M.P. 295 in Rio Blanco County, CO. Once a mutually agreeable site has been selected, Northwest will be responsible for acquiring the site via

exclusive easement or as fee property, including any access which may be needed to the site. Costs are included in the estimate for acquisition of a 100' x 100' (0.23 acre) parcel and an environmental audit of the property.
SURVEY

Northwest is responsible for acquiring the interconnect site and shall also be responsible for surveying the site to identify and locate metes and bounds, topography, any existing structures, property lines, pipeline rights-of-way, easements, utilities, etc. as well as conducting a geotechnical study, if necessary, to facilitate engineering and design.

1.2.2 GENERAL DESIGN CRITERIA

Town of Dinosaur provided the following proposed minimum and maximum gas flow rates to Northwest in the Interconnect Data Sheet:

Gas Flow Summary	Initial
Peak Hourly Rate on Peak Day (MSCFH / DTH/H)	8
Max. Daily Volume (MSCFD / DTH/D)*	125
Min. Hourly Rate (MSCFH)	0.5
Min. Hourly Rate to Daily Rate (MSCFD)	12
Requested Min. Pressure (psig)	60

* Maximum daily volume is the maximum hourly rate multiplied by 24 and divided by an hourly peaking factor of 1.54.

1.2.3 PROPOSED FACILITY CAPACITY

Based on recent FERC filings and standard engineering practices, the Mainline pressure used for design of these facilities is 450 psig. The MAOP of the Mainline used for determination of the minimum capacity of the meters is 809 psig.

Min. & Max. Volume at Design Pressures			
	Min Hourly Rate @ 809 psig (MSCFH)	**Max Hourly Rate @ 450 psig (MSCFH)**	**Max Daily Volume @ 450 psig (MSCFD)***
CMFS040 2/5" Coriolis	0.33	8	125
2" yard piping	N/A	213	3,323
2" bypass	N/A	301	4,691

* Maximum daily volume is the maximum hourly rate multiplied by 24 and divided by an hourly peaking factor of 1.54.

1.3 KEY MILESTONES

Upon execution of a Facility Agreement, a Signal Lease Agreement and receipt of prepayment, authorization will be issued to commence engineering, design, obtaining permits, material procurement, and construction.

Facility and Signal Agreement(s) to in-service	December 15, 2020
Requested in-service date	September 15, 2021
Proposed in-service date	September 15, 2021

1.4 PERMITS

Based upon the information furnished by Town of Dinosaur, Northwest intends to design and construct the proposed facilities pursuant to the automatic provisions of Section 157.211(a) of the Federal Energy Regulatory Commission ("FERC") regulations once the Facility Agreement has been executed. In accordance with the provisions of Section 157, Subpart F, Northwest will acquire all necessary and applicable permits and clearances associated with constructing the interconnect, including cultural resource, threatened and endangered species, and wetland delineation. For automatic authorizations, there is a 45 day landowner notification period.

Northwest will also be responsible for obtaining all other applicable federal, state, county, and local permits and approvals, such as the soil plan, hydrostatic test water discharge notification, site plan approval, conditional use and zoning approval and variances, building and electrical permits, etc. Northwest's permitting effort may include preparing a site plan, grading plan, soil erosion control plan, and building and electrical permit drawings for submittal to the local permitting agencies. Costs are included in the estimate for site evaluation, preparing such plans, meeting with the agencies and paying application or processing fees.

NO CONSTRUCTION ACTIVITY BY NORTHWEST WILL COMMENCE UNTIL ALL CLEARANCES, APPROVALS AND PERMITS ARE RECEIVED.

2 PRELIMINARY COST ESTIMATE

All costs in this proposal represent a preliminary estimate or order-of-magnitude cost for purposes of ***preliminary*** discussion and to provide a sense of ***relative*** magnitude to Town of Dinosaur. The estimate represents only anticipated capital costs and expenditures incurred by Northwest on behalf of Town of Dinosaur and its own behalf for the interconnect facilities. Once a draft Facility Agreement is initiated and both parties agree to the scope of work and facilities for which Northwest will be responsible for designing, constructing, owning and operating, then the scope

description and estimate will be revised accordingly by Northwest. The revised scope and estimate will be used as the basis for the final draft of the Facility Agreement, including the reimbursable/prepayment amount. In addition to the reimbursable amount, Town of Dinosaur shall be responsible for the tax gross-up amount, (calculated as a percentage of the reimbursable amount).

All direct costs are stated in 2020 dollars. As a pre-paid project, no AFUDC costs are included. Company labor and expenses are included in the estimate for engineering, design, project management, obtaining permits and clearances, site visit(s), material procurement and inspection, construction supervision and other project support activities. This cost estimate was prepared without the benefit of a site visit and assumes construction during the normal construction season.

Exhibit 11: Conquering Carbon Summary

Conquering Carbon

Steven Shute, PE ***October 2020***

Synopsis:

Climate Change is for real.
The whole planet's climate has changed by a few degrees, and is getting warmer.
There is no credible Science to refute this. Denial is not a solution.
This is caused by burning Fossil Fuels and CO_2. We are all to blame.

What steps can we take to avoid an environmental catastrophe? Mostly, we have to drastically reduce the carbon dioxide or CO_2 produced by burning fossil fuels. This 4000-word analysis uses the US Energy Information Agency EIA annual Sankey diagram of energy sources & uses. The US consumes about 100 Quads of energy per year (1 Q is about 1 million tanker truckloads of oil). In 2019, about 85% of US energy was from fossil fuels Coal-Oil-Gas.

What should our civilization do, now, that makes the biggest impact?

The study identifies **Five Big Steps** for the US in technology & funding:
1) Retiring **coal-fired power plants** will save 80% wasted heat and largest CO2 source. (2.2 Q)*

2) Converting all new **oil-fueled cars & trucks** to EV electric vehicles will require automakers to expand ***100x*** in producing EVs. (3.0 Q)

3) Retiring **gas-fired power plants** will strand $ billions in plants that are fairly new. (2.6 Q)

4) Replacing all remaining **oil-fueled transports** (older cars & trucks, and trains and ships) with EVs and other technology which isn't actually, currently available yet. (3.0 Q)

5) **Industrial** processes are varied and complex, and most conversion not yet feasible. (10+ Q)

These **Five Big Steps** will replace processes that are only 20-25% overall efficient; will reduce the US energy diet by 3/4ths, along with CO_2 emissions. *But to achieve that, Solar & Wind (and other technologies not yet available) must grow by 20+ Quads, from 3.8 Quads today; and must grow quickly, cleanly and economically, which aren't usually compatible.

As individuals, our natural gas home heating processes are 90+% efficient, and only 10% of the US energy mix. Especially in cold climates and remote areas, these should be among the last priorities for conversion. Until and unless the Five Steps are solved, and the technologies & economics improve significantly for small users, Natural Gas will likely play a critical role for several more decades.