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Municipal Drinking Water Supply Plan

Last Chance Basin Water Treatment Building
(Gold Creek)

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Purpose

The City and Borough of Juneau (CBJ) obtains excellent quality drinking water from both of its water supplies in Gold and Salmon Creeks. This plan has been prepared so that elected officials and the public may better understand and discuss the future of Juneau's water supply system. This plan incorporates anticipated water supply maintenance and improvement projects, water management concepts, and policy positions.

CBJ's Gold Creek water supply is obtained from the Last Chance Basin well field, which consists of five wells that are between 100 and 130 feet deep. Since the water from these wells has been determined to be ground water not under the influence of surface water, the only treatment required is chlorine disinfection for the inactivation of viruses.

Salmon Creek water is an unfiltered surface water source, and is considered a secondary interruptible supply. Since 2005, the Salmon Creek water source has been taken off line four times due to high turbidity (cloudiness) and three times for maintenance. Inactivation of *Giardia* and viruses is currently accomplished by the addition of chlorine. Additionally, CBJ adds soda ash to the water from Salmon Creek to adjust the pH of the water and to reduce the leaching of lead and copper from customer plumbing. The treatment is required in order to comply with Alaska Department Environmental Conservation (ADEC) and Environmental Protection Agency (EPA) rules.

The CBJ Water Utility budget is approximately $3.9M per year. Both water supplies are considered to be of excellent quality, and both the Gold and Salmon Creek water have significant ongoing major maintenance requirements. While this discussion is limited to the supply side of the water system, there also exists an extensive water storage and distribution system which consists of 180 miles of mainline pipes, over 8,000 water services, 1,310 fire hydrants, 7 pump stations, and 7 water reservoirs that store 11 million gallons of water. The maintenance of those facilities is independent of the requirements for the supply system infrastructure.

The AJ Mine Related Water Study (February 24, 2012) considered a variety of scenarios that analyzed the possibility of a re-opened AJ Mine with improvements or changes to the municipal drinking water system. Of those considered, Scenario #4 best addresses the long term needs of the CBJ. The purpose of this plan is to adopt an approach for managing the drinking water supply whether or not the CBJ chooses to pursue re-development of the AJ Mine.

Current Use

On average, the CBJ uses 3.5 to 4.5 million gallons of water per day (MGD), with the higher values occurring in the summer, primarily spurred by sales to cruise ships. Of that volume, Last Chance Basin typically provides 3 to 4 MGD and Salmon Creek provides 0-2MGD). There are operational benefits that favor Gold Creek over Salmon Creek water:

1. There is a slight cost associated with the addition of soda ash (about $15,000 per year for materials and labor).
2. Due to seasonal turbidity in Salmon Creek water, the source is periodically taken on and off line. This intermittent use defines Salmon Creek as a secondary source.

It is expected that these operational benefits will continue in the future. If a filtration plant is added at Salmon Creek, utility staff will have the additional operational costs of the filtration plant.

Existing Supply Infrastructure Maintenance

The Gold Creek water supply system may require major maintenance in the coming years. Additionally, major components of Salmon Creek infrastructure, which are owned and maintained by AEL&P, are very old, and may also require maintenance. Both systems have major maintenance liabilities. The major maintenance activities include the following:

1. *Last Chance Basin Well-field Rehabilitation*

Water production capacity has declined in some of the Last Chance Basin wells. This has occurred over time due to a combination of mineralization of well screens and migration of fines in the aquifer. There are a number of well rehabilitation methods that can be used to maintain and improve declining flow, and at some point, a new well may have to be drilled at another (nearby) location in the aquifer. Excessive pumping of the well field can lead to decreased production or decreased well life. Proper management of the well field requires that wells be operated episodically, including being left for periods of rest. As production declines in the individual wells, rehabilitation or replacement will be required.

2. *Inspection and Maintenance of the JUALPA Tunnel*

Water is pumped from the Last Chance Basin well field into a pipe and tunnel system that takes water to Cope Park. This tunnel is called the Jualpa Tunnel, and was originally driven in about 1905. The tunnel provides the primary water feed from the Gold Creek system. In the early 1960s CBJ decided to use this former mining tunnel as part of its water system, improvements were last made in the early 1990s. The tunnel is a critical piece of the Last Chance Basin water supply system and should be regularly inspected and maintained. The tunnel has not been inspected since the last improvements were made.

3. *Inspection and Maintenance of the Mill Tunnel and Supply to South Franklin Street*

Water is pumped from the Last Chance Basin into an old mining tunnel named Mill Tunnel that passes through a ridge of Gastineau Peak to a location above South Franklin Street. Mill Tunnel was driven in the 1920s. Mill Tunnel is used as an in-mountain water storage reservoir with a capacity of approximately 3.2 million gallons. The water then enters into the distribution system on South Franklin Street, roughly opposite the South Franklin Dock. In the mid 1970s, CBJ decided to use this former mining tunnel as part of its water storage system. The tunnel and hillside piping are critical pieces of the system and should be regularly inspected and maintained.

4. *Salmon Creek Dam Maintenance/Study/Rehabilitation*

Owned and maintained by Alaska Electric Light & Power (AEL&P), the Salmon Creek Dam impounds water that is used for power generation, fish rearing, and drinking water. Construction of the dam was completed in 1914. The impoundment of water provides for clean and cheap hydroelectric power, and allows for storage of sufficient quantities of water for the operation of the Douglas Island Pink and Chum (DIPAC) hatchery and the municipally operated Salmon Creek water supply. When last studied in the 1980s, aging of the dam concrete caused AEL&P to lower the pool elevation of the reservoir, thereby decreasing the capacity of water held behind the dam to approximately 3.9 billion gallons of water. As part of a Federal Energy Regulatory Commission (FERC) re-licensing process, AEL&P is again studying the dam. Final results of this re-licensing study are expected this fall. It is expected that AEL&P will either maintain or slightly lower the pool elevation as a result of this study. Given the capacity of the impoundment, a lowering of the pool would not affect CBJ's ability to use its water right from the source. CBJ's chlorine contact tank is designed to treat up to seven MGD; typically, CBJ uses no more than two MGD of Salmon Creek water.

However, a lowering of the reservoir pool elevation may change the characteristics of turbidity events. Exposure of un-vegetated soils at the edges of the reservoir could lead to increased turbidity in the water source. It is in the long-term interest of AEL&P, DIPAC, and CBJ that the dam be kept operating for the foreseeable future. FERC relicensing occurs on 30-year intervals.

5. Salmon Creek Penstock Replacement

Portions of the AEL&P penstock (the pipe that leads from the dam to the power generating facility) are nearly 100 years old. At some point in the foreseeable future, this section of the pipe will have to be replaced. When the pipe is being replaced, the power company will have the choice of either taking the entire facility off line or of constructing a temporary bypass piping system. If the facility is off line during this reconstruction, AEL&P will not generate power, CBJ will not be able to use the drinking water source, and DIPAC will not be able to raise fish. Temporary bypass piping could be sized to meet any combination of needs of the three parties. As such, the cost of the temporary piping will likely be borne by the entities that make the choice to contribute funding to that piping. Compared to DIPAC (peak 14MGD in summer), CBJ is a minority water user. It is in the long-term interests of all three parties that the penstock be maintained and replaced when it has reached the end of its design life.

Water Management Issues

1. Tri-Party Agreement Renewal

AEL&P, DIPAC, and the CBJ use water from Salmon Creek under a 30-year agreement that is expiring in 2016. The agreement is referred to as the "Tri-Party Agreement." AEL&P plans to begin negotiations to renew the agreement in the near future.

2. Gold Creek Water Resources

Depending on the time of year, up to 14% of the water in the Gold Creek watershed flows into and through the AJ Mine, exiting through the Gold Creek Drainage Tunnel, which discharges just upstream, from the Last Chance Basin Mining Museum and the Last Chance Basin Well Field. The concept of diverting the Drainage Tunnel waters away from the Well field has been widely discussed. In the 1990s while reviewing Echo Bay's permit applications, the CBJ Planning Commission found that diversion of the drainage tunnel waters would protect the quality of water in Last Chance Basin. However, diversion of the Drainage Tunnel waters could also lead to low water availability during extended cold and dry winter months.

i: Inflow Diversion - Surface ditching in Silverbow Basin area (near the end of the Perseverance Trail, vicinity of glory holes) could reduce the amount of waters that enter the mine, and would therefore reduce the reduction to the drinking water aquifer if the Drainage Tunnel was diverted. Also, additional waters could be intercepted at higher elevations in the mine and discharged back into the watershed.

ii: Drain Tunnel Water Diversion

The drainage tunnel water could be intercepted and diverted to either the Gastineau Channel or to a location down stream of the Last Chance Basin well field. Diversion to the Channel would presumably occur through the sea level access contemplated by the AJ Mine Advisory Committee (AJMAC). Diversion to a location below the well field could provide water to the AEL&P flume during lower flow periods.

Water Supply Expansion Preference – Plan for Salmon Creek

In the event that the CBJ needs to increase its supply of drinking water, the preferred method for producing that water is the construction of a filtration plant at the Salmon Creek water source. Construction of a filtration plant would make Salmon Creek a year round source.

Reasons for selecting Salmon Creek for increased water supply include:

a. An additional draw of water from Gold Creek may not be feasible on a year round basis. Reasons include: low flows in winter, future diversion of drainage tunnel waters, and lack of water rights.
b. Salmon Creek is most likely to be higher quality that the potentially available other sources.
c. Low operating cost. A 4MGD filtration plant would cost about $150,000/year to operate.
d. It would be easy to expand production incrementally at Salmon Creek.
e. CBJ has unused water rights (currently CBJ makes beneficial use of up to 2.0MGD, has water rights for up to 10 MGD).
f. Design life of a filtration plant would match re-licensing period of the dam.

Water Supply Expansion – Triggering Action

Reasons that the CBJ may choose to construct a filtration plant at Salmon Creek include the following:

a. Increased municipal demand (Community Growth).
b. Increased cruise ship demand.
c. Diversion of drainage tunnel waters resulting in reduced quantity availability from Last Chance Basin.
d. Reduced production from Last Chance Basin due to declining well field production.
e. Regulatory requirement (not currently anticipated).
f. Increase in turbidity in Salmon Creek (landslides, lowering of reservoir pool elevation).

Policies of the City and Borough:

This Municipal Drinking Water Supply Infrastructure and Management Plan includes the following policies of the CBJ:

Policy #1: It is the policy of the CBJ to maintain the excellent quality and quantity of the municipal drinking water system.

Policy # 2 In the event the CBJ leases the property to an operator, to the extent feasible, the operator will be required to divert the Gold Creek Drainage Tunnel waters to a location downstream of the Gold Creek well field or to the Gastineau Channel.

Policy #3: The CBJ supports AEL&P in its maintenance and operation of the Salmon Creek Dam and penstock, rehabilitation, and relicensing but it is the policy of the CBJ to not accept additional municipal responsibility for the dam or the penstock.

Policy #4: To the extent funded by industry fees, the CBJ will improve and expand infrastructure to allow seasonal or increased cruise ship water demand.

Policy #5: It is the policy of the CBJ to manage the use of the Last Chance Basin well field so that well rehabilitation is not unduly required. (If Salmon Creek is off line in the summer, proper management of the well field could limit the availability of water for sale to cruise ships.)

Salmon Creek Dam (Wikipedia)

German Parra (flickr, 2007)