CHEFORNAK WASHETERIA AND WATER STORAGE TANK

JUNE 2013

DESIGN ANALYSIS REPORT

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Prepared by:

CE2 Engineers, Inc.

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Section 1 Executive Summary

The Design Analysis Report (DAR) for the proposed Washeteria and Water Storage Tank Project is the next to final step in the design of these facilities. This report will provide the basic design parameters for the components of this project, namely:

- Background information on land and land status;
- Water source information;
- Geotechnical information;
- Civil design for improvements;
- Foundation design for the Washeteria and Water Storage Tank;
- Architectural design for Washeteria;
- Structural considerations for Washeteria and Water Storage Tank;
- Mechanical design concepts for Washeteria;
- Electrical design parameters for the facilities.

A conceptual level (35%) plan set accompanies this DAR, and is presented in Appendix A.

The location of this facility will be northeast corner of the same lot used by the City Power Plant. This will allow convenient connection to the water distribution loop, electric power, fuel oil, and waste heat recovery from the power plant generators.

The soil conditions on the proposed site are very similar to that of the school and the nearby power plant: a top layer of one ft of organics, with a plastic silt layer below the organics, containing ice crystals and a salinity of a few parts per thousand. Geotechnical findings and recommendations are provided in Appendix B.

It was recommended by the geotechnical engineer that an insulated earthen pad be placed atop the undisturbed soil to support a space-frame foundation (Triodetic®) for the Washeteria. This will keep the building from heating the soil, and will minimize snow drifting. The Water Storage Tank will sit directly on the insulated pad, with additional insulation in the pad to prevent excessive heat migration to the pad and soil below.

The Washeteria building will be of a highly insulated design, atop the Triodetic® foundation, and will consist of a wooden joist system for flooring. Exterior wall panels will be SIP construction, with gypsum drywall interior and metal siding exterior. The roof will be a clear span on top of a glu-lam ridge beam, with 12-in of insulation and a 2-in air gap, for a cold roof top to eliminate condensation in the interior of the roof section. Roofing will consist of metal siding, and the ceiling will be cathedral-type, except for offices and bathrooms.

The water storage tank (WST) will be of bolted and gasketed sections, in a standard AWWA (American Water Works Association) bolted tank design, with NSF 61-certified powder coated interior surfaces in contact with water. The tank will be insulated with 6-in of foam insulation with a coated aluminum shell, and 6-in of foam under the tank bottom in the earthen foundation.

The new facility will be equipped with the following laundry equipment:

- Four 30-lb front loading washer-extractors;
- Two 18-lb front loading washers;
- Three each 30-lb stack dryers (total of six tumblers)

Laundry equipment data sheets are provided in Appendix C. Ozone disinfection for washers will provide better sanitation of clothes and help to prevent the spread of communicable disease.

The heating system will be hydronic, and will consist of a primary-secondary heating system designed to utilize waste heat from the City Power Plant to the greatest extent possible. Major pumps will be equipped with self-contained variable frequency drives to minimize electric power consumption, and heating coils will be controlled by valves to minimize standby heat losses. Three smaller boilers will supply heat to the hydronic system to supplement the waste heat. A dedicated single boiler will supply high level heat to the second-stage heating of the dryer air that recovered waste heat cannot supply.

Electric power will come directly from the nearby City power plant. It will be obtained from the City's 480 volt 3-phase plant supply bus and will go through a 200 amp meter/main with a 125-amp circuit breaker at the Washeteria. Inside the Washeteria mechanical space, the 480 volt 3-phase power will be stepped down to 208Y120 3-phase and will be distributed through Panel A. The location of the transformer will allow heat generated within to be transferred to the interior space of the building. Maximum loading of the system is estimated at 60 KW. See the one-line diagram on Sheet E3.1 of the 35% Plan Set (Appendix A).

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Section 2 Introduction

The proposed Washeteria and Water Storage Tank at Chefornak is being designed to replace the existing provisional Washeteria to enable the community to wash and dry clothes in a more sanitary and convenient manner. It also will provide for bathroom and bathing facilities, and is designed to be fully handicap-accessible.

This project was the first priority of improvements to the Chefornak Water and Sewer System. The present provisional Washeteria, constructed in 2010, was envisioned as a stop-gap measure to provide limited laundry cleaning facilities and showers until the new Washeteria could be constructed. It was built in the shell of the old power plant building, with boilers and circulating pumps installed in the existing heat recovery building, adjacent to the power plant building.

The new facility will have the following laundry equipment:

- Four 30-lb front loading washer-extractors;
- Two 18-lb front loading washers;
- Three each 30-lb stack dryers (total of six tumblers)

Ozone disinfection for the washers will provide for better sanitation of clothes and help to prevent the spread of communicable disease.

Plan View and Elevations of the proposed facility are seen on Sheets A1 and A2 of the 35% Plan Set (Appendix A).

A 22,000-gallon bolted and gasketed water storage tank will serve as the main supply tank for the Washeteria, and to provide a volume of reserve water for the community when the wells are down for maintenance and repair.

Wastewater disposal will be through a lift station and force main connecting to the existing school force main to the City provisional tundra pond lagoon. Eventually, the force main will be extended and a new facultative lagoon will be constructed to provide for wastewater treatment for the community.

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Section 3 Background

3.1 Location

The site for the proposed Washeteria and Water Storage tank is located in the northeast corner of the power plant (Lot 7, Block 7, Tract A, USS 4421). This site was selected because:

- It provides for easy access for the public to the facility;
- It is close to the existing school sewage force main for disposal of wastewater;
- It can be easily connected to the 480 volt 3-phase power at the power plant;
- Recovered heat from the existing power plant is close to the proposed Washeteria building, so use of this heat is practical and economical for the Washeteria.

3.2 Existing Site Conditions

3.2.1 Existing Facilities

A provisional Washeteria was constructed using the building shell of the original electric power plant (20 ft long x 17 ft wide). Since the facility is so small and limited, it is imperative that the new Washeteria be constructed so that the public be fully served.

The existing Facility is immediately west of the new power plant. It is located on Lot 6, Block 7, Tract A, USS 4421.

3.2.2 Land Status

The power plant lot (Lot 7, Block 7, Tract A, USS 4421), was deeded over to the City of Chefornak, along with other lots, on March 20, 1986. The Trustee Deed is shown in Appendix D.

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Section 4 Water Source

The present water source is a well drilled by the US Public Health Service in 1964 in the northeast corner of the community near the PHS Pump House. This water has a total dissolved solids TDS of approximately 1000 mg/liter at this time. The other main component of the water is color, which was seen to be in the vicinity of 80 PCU. As this is used for utility water for washing clothes and showering, this water is not presently treated, with the exception of filtration with a multimedia filter.

The water from this existing source, as well as the water from the pair of 2002 wells to the south of the community, has a problem with treatment using conventional methods of coagulation and multimedia filtration because of the high levels of TDS, which interferes with the coagulation process.

Below is a table of water quality parameters of the wells drilled in 2002, which are roughly representative of the original PHS well that is presently used for the existing water distribution and watering points. Well and water quality data are provided in Appendix E.

TABLE 1 – Raw Water Parameters in September 2002

Water Parameter	Well W02-2	Well W02-3	MCL
Total Organic Carbon, dissolved	5.82 mg/l	5.60 mg/l	
Total Organic Carbon	5.38 mg/l	5.26 mg/l	
UV254	n/m	n/m	
Total Dissolved Solids	390 mg/l	435 mg/l	500 mg/l
Turbidity	01.16 NTU	2.21 NTU	0.5 NTU
True Color	80 PCU	80 PCU	15 PCU
CO_3 Alkalinity	20 mg/l	15 mg/l	
HCO_3 Alkalinity	250 mg/l	246 mg/l	
Hardness as $CaCO_3$	10.0 mg/l U	10.2 mg/l U	
pH	8.80	8.70	6.5 to 8.5
Aluminum	n/m	n/m	0.05 to 0.2 mg/l
Calcium	0.556 mg/l	1.01 mg/l	
Magnesium	3.06 mg/l	0.91 mg/l	
Silver	n/m	n/m	0.1 mg/l
Nitrate-N (measured as nitrogen)	0.208 mg/l	0.200 mg/l	10.0 mg/l
Nitrite-N (measured as nitrogen)	0.200 mg/l U	0.200 mg/l U	1.0 mg/l
Bromide	n/m	n/m	0.1 mg/l
Antimony	ND	ND	6 µg/l
Arsenic	2.00 µg/l U	2.00 µg/l U	10 µg/l

Water Parameter	Well W02-2	Well W02-3	MCL
Barium	9.84 µg/l	29.0 µg/l	2000 µg/l
Beryllium	0.40 µg/l U	0.40 µg/l U	4 µg/l
Cadmium	ND	ND	5 µg/l
Chromium	ND	ND	100 µg/l
Copper	1.9µg/l	1.52µg/l	1000 µg/l
Cyanide	ND	ND	0.2 µg/l
Fluoride	ND	ND	2 mg/l
Mercury by Cold Vapor	ND	ND	0.2 µg/l
Nickel	ND	ND	100 µg/l
Selenium	ND	ND	50 µg/l
Thallium	ND	ND	2 µg/l
Chloride	18.8 mg/l	64.5 mg/l	250 mg/l
Langlier Index @40F	-0.33	-0.07	
Langlier Index @140F	-0.75	1.01	
Iron	0.134 mg/l	0.340 mg/l	0.3 mg/l
Odor (TON)	ND	ND	3 TON
Manganese	0.013 mg/l	0.032 mg/l	0.05 mg/l
Sodium	123 mg/l	139 mg/l	250 mg/l
Sulfate	ND	ND	250 mg/l
Zinc	2.33 µg/l	2.00µg/l U	500 mg/l
Total Potential Trihalomethanes	n/m	n/m	80 µg/l
Total Potential HAA5	n/m	n/m	60 µg/l
Ammonia (as nitrogen)	n/m	n/m	
Dissolved oxygen	n/m	n/m	
Hydrogen sulfide	n/m	n/m	
Carbon dioxide	n/m	n/m	

n/m not measured ND not detected

Eventually, the 2002 wells will be delivering water to the water distribution loop. See Figure 3 Water System Schematic in *Work Plan for Chefornak Core Water and Wastewater Facilities*, prepared by CE2 Engineers, Inc., Final Update March 2013.

Section 5 Site Plan

The site plan for the Washeteria and Water Storage Tank is shown in the 35% Plan Set on Sheet C2 (Appendix A). It lies in the northeast corner of the lot where the city power plant is located. The Washeteria facility is located as close as practical to the north and east property lines to be non-rated construction (Type V-B). This facility location still provides a short and convenient connection to electric power and recovered heat from the City's power plant, as well as a short extension to the City water distribution loop for heat addition.

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Section 6 Design Requirements and Considerations

6.1 Building

6.1.1 Basic Design Criteria

- Applicable Codes: Title 13 of the Alaska Administrative Code, Chapters 50 through 55, was adopted and amended to the 2009 International Building, Fire, and Mechanical Codes, as adopted and amended by the State of Alaska.
- Design Minimum Temperature: -45°F
- Design Degree-Days for heating to 65°F: 13,200 °F*Days / year
- Design ground snow load: 40 lb/sf. Note that snow drifting is a significant factor in Chefornak.
- Maximum Wind, 3-second gust: 130 MPH
- Seismic Design: Site Class D, Spectral response acceleration at short period---S_{DS} = 0.15, for long period--- S_{D1} = 0.07

6.1.2 Site Civil and Foundation

6.1.2.1 Soil Conditions

There has been no soil boring performed at the proposed site of the Washeteria and Water Storage Tank. There will be some testing done in mid-June after the snow is gone to establish the depth of the top organic layer, and to verify that soils underlying the top organic layer are not materially different to that encountered at the school or power plant sites. This limited testing will also verify that there are no significant ice lenses under the proposed Washeteria and Water Storage Tank foundation pad.

A memorandum from Mike Hendee to Duane Miller of Duane Miller Associates (Appendix B) on May 17, 2006 noted the following:

> *We reviewed the samples that had been collected during the pile installation for the power plant at Chefornak and tested 15 of the samples for moisture content and pore water salinity. The tested samples were from across a range of pile locations and depths. Visual classification generally described the samples as plastic, organic silt (OL). As shown in the table below the samples have moderate to high moisture contents (ice contents). The measured pore water salinity is low. The highest measured salinity is 1.2 parts per thousand (ppt) which would result in a freezing point depression of about 0.1°F.*
>
> *Based on this data we conclude that the pile capacities recommended in our report to you dated April 2003 are appropriate provided the thermal syphon pile keeps the ground at an end-of-*

summer temperature at or below 30° F. Temperatures should be measured at the end of this summer in the pipes adjacent to the piles.

The plastic, organic silt (OL) layer underneath the organic surface layer is consistent with that found on the school site nearby to the southwest of the power plant.

6.1.2.2 Select Fill Material and Source

A large stockpile of type D-1 fill imported by barge from Nome around 2000 and staged near the beach north of the National Guard Armory is still in place. This is a non-frost-susceptible (NFS) material that was originally destined to be used for fill for the proposed water treatment plant, which was not built. At the time of the soil sampling at the location of the proposed Washeteria and Water Storage Tank, a simple survey will be done to ascertain the volume of remaining material available for the proposed facility pad. If this required quantity is short, then some additional fill will have to be obtained form either Nome or Platinum by barge.

6.1.2.3 Site Grade

The proposed site for the Washeteria and Water Storage Tank sits on relatively flat, but rolling high point of land, which descends to the west southwest at an approximately 2% grade. This can be seen in the site plan on Sheet C2 of the 35% Plan Set (Appendix A).

6.1.2.4 Foundation Type

There were several types of foundations considered for the Washeteria and Water Storage Tank. They would be either be set up on a pile foundation with passive cooling, or would use an earthen pad built directly on top of the existing soil with minimal disturbance.

The pile foundation has proven successful with higher building and pile loadings, as found with the school and the power plant. However, this type of foundation is expensive, and requires long-term mobilization and site storage of equipment to do the job, which significantly drives costs up.

For the lighter loadings found with the Washeteria and Water Storage Tank, building upon an earthen pad would be much more economical, and would not require heavy equipment such as large drills for pile holes.

The fill would be built up directly on the undisturbed ground surface. The ground would be first covered with a geotextile, and then the fill would be added in lifts and compacted to a depth of 18 inches. Separate flat loop type thermosyphons would be installed on the Washeteria and Water Storage tank. Six inches of fill would be added on top of the thermosyphon loops. On top

of this soil layer would be placed a four-inch layer of rigid foam insulation under the Washeteria and 6-inches of insulation under the Water Storage Tank. An additional eight inches of soil would be placed atop this insulation layer and compacted. The Water Storage Tank would sit directly on the soil layer, and the Washeteria would be set atop a Triodetic® foundation connected to the earthen fill with treated wood square pads.

See Sheet C4 in the 35% Plan Set (Appendix A) for details of the earthen pad, insulation, and thermosyphons.

The intent of this design is to produce an economical foundation with the least disturbance to the soil at the site.

6.1.3 Architectural

6.1.3.1 Building Form

The building will be a one story rectangular structure, 28-ft wide x 54 ft long, with a gross area of 1512 sq ft. with an open ceiling. The roof will consist of a ridge beam and columns, supporting rafters with a clear span between the ridge and the exterior side walls. The ends of the roof beams will be configured in gable fashion.

The floor will be standard wood joist construction sitting on glu-lam beams, which in turn are supported on a Triodetic® foundation on an earthen pad.

Partition walls will be non-structural and will be 2x4, 2x6, or 2x8 framing, as required.

Building outside walls will be 8 in thick SIP panels, and the roof will be constructed of engineered joists (BCI's) with OSB or plywood sheathing.

6.1.3.2 Exterior and Interior Materials

Exterior materials for the roof and walls will be OSB or plywood, sheathed with metal roofing and siding. The soffit on the underside of the floor will be plywood.

Interior materials will be OSB or plywood on the walls and ceiling, with vapor barrier and 5/8" sheetrock. Floor decking will be 1-1/8" thick plywood covered with 3/8" thick underlayment and a rolled goods floor.

6.1.3.3 Thermal Envelope

The thermal envelope of the Washeteria is designed to provide exceptionally low heat loss. The walls will be 8-inch rigid Styrofoam in SIP panels, so the insulation value of the walls will approximately be R-30. The roof will consist of 14 in deep BCI rafters and 12 in of fiberglass insulation for an approximate R-40. Floor would be joist-type construction with 8-in of rigid Styrofoam insulation, with an approximate R value of 40.

6.1.4 Structural

Design criteria, as related to the structural component of the Washeteria and the Water Storage Tank are:

- Design ground snow load: 40 lb/sf. Note that snow drifting is a significant factor in Chefornak.
- Maximum Wind, 3 second gust: 130 MPH
- Seismic Design: Site Class D, Spectral response acceleration at short period---S_{DS} = 0.15, for long period--- S_{D1} = 0.07

Wind will be the governing factor in designing the structure to resist wind pressures and the resulting overturning moment on both the Washeteria and the Water Storage Tank when it is empty (worst case).

For the Triodetic® foundation system, numerous foundation pads are required to spread the load evenly over the building footprint (in this case, an insulated and passively cooled earthen pad). Foundation pads for the Triodetic® system will be two crisscrossed layers of 3x12 or 4x12 foundation grade timbers, built into a 2-ft or 3-ft square pad. The bottom layer will be dug into the top of the fill to help key the building to the ground to resist lateral movement. Additional deadman-type buried anchors in the earthen pad will be used to help resist overturning moments due to wind loads. For a preliminary design, please see Sheet S2 of the 35% plans (Appendix A).

The worst-case scenario for loads on the Water Storage Tank will be the possibility of overturning moment due to wind loads on an empty tank. This will be resisted by buried anchors in the foundation pad.

6.1.5 Mechanical

The heating system in the Washeteria will be a primary-secondary hydronic system with a primary loop acting as the “heat main” receiving heat from the waste heat recovery system from the City power plant (first priority) or from three-staged oil-fired boilers. A separate boiler is

dedicated to run just the final coil on each dryer to produce an air temperature of at least 185°F for incoming air into the dryers. The schematic for the hydronic heating system can be seen on Sheet M1 of the 35% drawings, and a tentative mechanical floor plan is seen on Sheet M2 (Appendix A). Approximate heat loads are shown on M1.

The estimated average waste heat available is about 600,000 BTU/hour. Peak amount of waste heat available envisioned is about 800,000 BTU/hour. The larger pumps will have their own variable frequency drives installed so that they can vary their speed to meet a constant pressure requirement or vary their speed to meet a maximum supply/return temperature requirement. This arrangement will save considerable amounts of electrical energy.

All piping, boilers, and appurtenances will be well insulated to minimize standby losses, thus saving heat energy. Coils will be operated by thermal or motorized valves to put the heat where it is needed, and not wasted in standby losses.

Much of the system can be run on waste heat from the power plant, but the dryers will require a two-stage coil arrangement. The first stage coil will preheat incoming air using the lower level heat of waste heat or the three boiler system, and then the final stage will use 210°F or 215°F heat from the dedicated boiler. Preheat of the outside air to the dryer coils will be done by two unit heaters in a space behind the dryers, using lower level heat.

Fuel oil for the boilers will be obtained from the existing 27,000 gallon horizontal storage tank behind the power plant, where it will be metered and pumped to the 100-gallon day tank in the mechanical area of the Washeteria.

6.1.6 Electrical

Electric power will come directly from the nearby City power plant. It will be obtained from the City's 480 volt 3-phase plant supply bus and will go through a 200 amp meter/main with a 125-amp circuit breaker at the Washeteria. Inside the Washeteria mechanical space, the 480 volt 3-phase power will be stepped down to 208Y120 3-phase, and will be distributed through panel A. The location of the transformer will allow heat generated within to be transferred to the interior space of the building. Maximum loading of the system is estimated at 60 KW. See one-line diagram on Sheet E3.1 of the 35% Plan Set (Appendix A).

To minimize electrical power use in this high cost area, high efficiency motors will be used and run time minimized or run speeds reduced by variable speed drives where appropriate. Power for lighting will be minimized by occupancy sensors. Outside lighting will consist of LED fixtures.

6.2 Water Storage

It is critical to have adequate water storage in the existing water distribution system:

- The watering points require adequate water to operate so the public can obtain water for bathing and washing clothes;
- To maintain circulation in winter, and to prevent freezing of the water distribution, it is necessary to have water from the existing PHS well available to pump into the system;
- It is necessary to have an adequate amount of water to supply the school ultrafiltration/ reverse osmosis (UF/RO) water treatment system with adequate water to fill their potable water tanks without interruption.

6.2.1 Design Criteria

The following design criteria govern the parameters of the water tank:

- The tank requires an NSF 61-approved interior coating;
- There must be two ports: one for drawing water out of the tank (tank suction), and another for filling the tank to the opposite side of the tank suction port;
- The suction and discharge piping should be able to handle 50 gallons per minute (2" piping will be adequate);
- The tank should be able to store 17,000 gallons of water in order to supply process water to the school UF/RO system without being refilled by the PHS well, and still have 3000 gallons left over to supply the watering points;
- The tank should have adequate insulation to go for days without additional heat added.
- The tank package should be of standardized design that is economical to ship and relatively easy to erect without having to bring in specialized equipment;
- The tank should have maximum ground pressure of 500 to 600 lb/sq foot.

6.2.2 Tank Size

The tank that meets these criteria will be a minimum size of 20,000 gallons plus 2000 extra gallons for a flooded suction. This would be a standard 22,000 AWWA bolted and gasketed tank with NSF 61 powder coated interior coating. Size would be 21.5 ft dia x 8.1 ft high.

The insulation package would have six inches of insulation covering the tank wall and top deck. Six inches of rigid styrofoam insulation would be placed eight inches below the top course of fill on the tank earthen pad.

6.2.3 Foundation

The tank foundation would be an insulated earthen pad with horizontal loop-type thermosyphons to keep the pad from warming up the undisturbed soil beneath it. See Sheet C4 (Appendix A) for details of the tank foundation.

6.3 Water Treatment

Because of the difficulty of treating the water to remove total dissolved solids (TDS) and color with this high TDS water, treatment other than chlorination has not been done, other than with the UF/RO treatment system at the school. The water from the PHS well as well as the two 2002 drilled wells is used as "utility water" and not as potable water, mainly because the TDS is typically 1000 mg/l.

6.3.1 Well Water Quality

A representative table of water quality values is found in Table 1 in Section 4 Water Source. Well and water quality data are provided in Appendix E.

6.3.2 Design Criteria

At present there is no plan to treat the utility water to potable water standards.

6.3.3 Water Treatment System Upgrades

At present there is no plan to treat the utility water to potable water standards.

6.4 Wastewater Collection, Treatment and Disposal

The Washeteria will require a lift station to take the gravity-fed wastewater and pump it to the school and city force main and eventually to the facultative lagoon.

6.4.1 Design Criteria

The daily wastewater flow is approximately 2000 gallons over a 10-hour period, or about 3.3 gallons per minute. Peak flow rates would be about 5 times the average flow rate, or about 17 gallons per minute. It is assumed that a 2-inch ID force main would be used to pump wastewater from the Washeteria lift station to the school force main. To maintain a 3.5 ft per minute velocity in the force main, 35 gpm will be required.

The main contribution of the Washeteria to the waste stream will be the volume of 2000 gallons per day, six days per week. With about 20 persons using the Washeteria per day, it is estimated that the daily BOD_5 contributed to the waste stream would be 20 persons x 0.17 lb = 3.4 lb/day BOD_5.

6.4.2 Lift Station and Lagoon Upgrades

With a theoretical diversity of flow, 17 gallons per minute peak flow may happen, but three washer extractors may be also be draining at the same time, which could produce up to 60 gpm for a short time and accumulate 100 gallons of wastewater in the lift station. A lift station with a capacity of 200 gallons should provide enough extra reserve capacity to prevent wastewater spills before water and washing machines can be turned off.

Upgrades to the City's Lagoon will be accomplished in a later project.

6.5 Environmental Determination and Permits

The City power plant construction at this location had a Finding of No Significant Impact (FONSI), so this may be used to avoid an additional environmental determination. The only permit required should be the Fire Marshal Plan Review, and possibly a wastewater discharge permit.

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Section 7 Floor Plan

7.1 Building Components

The proposed Washeteria building is 28 ft wide x 56 ft long, with a total area of 1,568 square feet. A floor plan of this option is shown on Sheet A1 of the plan set (Appendix A). The plan includes a laundry area, two restrooms, an operator's office and mechanical room.

The laundry area will include four 30 lb washer-extractors, two 18 lb front load washers, three 30 lb stacked dryer units for six tumblers total, a standard bathroom with tub, and an Americans with Disabilities Act (ADA) -compliant bathroom with handicap-accessible shower. The washer, dryers and showers will be token-operated. Tokens will be made available from the operator's office. Typical seating and laundry folding tables will also be available.

The mechanical area will include boilers, pumps, heat exchangers and ventilation equipment. The boilers and recovered waste heat from the power plant will provide heat to the building, as well as to the dryer preheat coils, using a hot glycol loop. Fuel for the boilers will be supplied to a day tank from the power plant's 27,000 gallon tank and will be metered to monitor fuel consumption. Waste will be discharged by gravity from the Washeteria to a pump station, then pumped through a force main to the existing wastewater lagoon. Electricity will be supplied from the city's 3-phase 480v power plant and will be stepped down to 208/120v in the washeteria mechanical room.

7.2 Construction Cost Estimate

[To be completed after first review of this DAR.]

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Section 8 Cost Summaries

[To be completed after first review of this DAR.]

8.1 Capital

[To be completed after first review of this DAR.]

8.2 Operation and Maintenance

[To be completed after first review of this DAR.]

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Section 9 Recommendations

The DAR delineates the design principles and parameters relevant to the construction of the proposed new Washeteria and Water Storage Tank.

After review, community input, any desired changes are made, and finalization of the DAR, the 65% and 95% drawings should be continued and completed as soon as practicable.

It would be especially useful to complete the foundation in the summer of 2013 to allow it to sit and settle over the winter of 2013-2014. This would ensure a more stable foundation would be available for construction of the facilities in the summer and fall of 2014.

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Appendices

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Appendix A

City of Chefornak, Alaska

Washeteria and Water Tank

35% Plan Set dated June 2013

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Appendix B

Geotechnical Findings/Recommendations:

Duane Miller Associates Piles Memorandum

Golder Associates Conceptual Geotechnical Considerations for Triodetic Frame Foundation Systems

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Appendix C

Laundry Equipment Data Sheets

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Appendix D

Power Plant Lot Trustee Deed

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Appendix E

Well and Water Quality Data

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