2016 Bulk Fuel Upgrades Letter Report
Beaver, Alaska

Prepared For:

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

Prepared By:

R&M Consultants, Inc.
212 Front Street, #150
Fairbanks, Alaska 99701

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Innovating Today for Alaska's Tomorrow

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ACRONYMS AND ABBREVIATIONS

AAF ..... Alaska Air Fuel
ADCCED ..... Alaska Department of Commerce, Community, and Economic Development
ADEC ..... Alaska Department of Environmental Conservation
ADOT&PF ..... Alaska Department of Transportation & Public Facilities
AEA ..... Alaska Energy Authority
AMSL ..... above mean sea level
bgs ..... below ground surface
BVC ..... Beaver Village Council
CP ..... cathodic protection
DFT ..... dry film thickness
DRO ..... diesel range organics
EAC ..... Everts Air Cargo
GRO ..... gasoline range organics
NIS ..... not-in-service
R&M ..... R&M Consultants, Inc.
SSPC ..... Society for Protective Coatings
TF ..... Tank Farm
VOC ..... volatile organic compounds
YFSD ..... Yukon Flats School District

2016 BULK FUEL UPGRADES LETTER REPORT
BEAVER, ALASKA

EXECUTIVE SUMMARY

The Alaska Energy Authority (AEA), on behalf of the Denali Commission, retained R&M Consultants, Inc. (R&M) under Notice to Proceed Agreement Number 17003, to develop bulk fuel upgrade alternatives and cost estimates in a letter report for the Village of Beaver, Alaska. The goal of the AEA's Bulk Fuel Upgrades Program is to upgrade non-compliant bulk fuel facilities in communities that meet program criteria, improve safety, and reduce the risk of fuel releases.

R&M developed a general work plan to complete the scope of work outlined in AEA's Request for Proposal Number 17003. Four primary work plan tasks were identified and executed to complete the scope of work. The four work plan tasks included: 1) initial research, interviews, and site visit planning; 2) site visit and tank farm (TF) repair/retrofit assessment; 3) development of fuel storage improvement alternatives for each bulk fuel facility; and 4) bulk fuel upgrades letter report preparation. The Village of Beaver bulk fuel situation and needs were determined through completing the scope of work, and upgrade recommendations were developed; both are discussed below.

SITUATION AND NEEDS

The two existing bulk fuel storage facilities in the Village of Beaver are eligible for assistance in the AEA's Bulk Fuel Upgrades Program. The existing bulk fuel storage facilities and equipment at TF1 and TF2 range from 20 to 40 or more years old. The current configurations and condition of these facilities result in code violations ranging from minor to major. Ultimately the existing facilities in their current condition pose medium to high risk, by presenting a number of hazards, to the environment and the life, health, and safety of residents and visitors of the community. Without bulk fuel upgrade action in the Village of Beaver hazards will persist and infrastructure will continue to deteriorate, exacerbating existing hazards and increasing the risk of additional hazards to develop over time.

In order to diminish risk and relieve existing hazards, bulk fuel facility upgrades are needed. To satisfy the need for bulk fuel facility upgrades in the Village of Beaver, existing bulk fuel facilities could be repaired or new code-compliant bulk fuel facilities could be constructed. In addition, the Beaver Village Council (BVC) is in need of a retail gasoline storage tank and dispensing system. Currently the BVC stores gasoline in a 55-gallon drums in a dilapidated "gas shack." Fuel is then transferred from the drums to end users via hand pump into 5-gallon gas cans.

Diesel #1/heating oil and gasoline transfer methods and equipment are in need of upgrade. Currently the BVC transfers diesel #1/heating oil from TF2 to a stationary 500-gallon, steel, double-wall tank situated outside of the containment area through a 2-inch rubber hose. Diesel #1/heating oil is then transferred from the stationary 500-gallon tank to a 500-gallon, steel, single-wall tank strapped to a double-axle utility trailer. The trailer is transported to generator house where the fuel is then transferred to a 1,000-gallon, Fireguard®, intermediate tank. Gasoline is transferred from the airstrip to the gas shack using three 300-gallon, steel, single-wall tanks. The 300-gallon tanks are mounted on deteriorated, home-made wooden skids.

UPGRADE RECOMMENDATIONS

Three alternatives were assessed to address the Village of Beaver bulk fuel storage facility situation and needs. The alternatives included:

- Option A – No Action
- Option B – Repair Existing Facilities and Equipment as needed
- Option C – New Code-Compliant Tank Farms

OPTION A – NO ACTION

Option A is not recommended. Without bulk fuel upgrade action in the Village of Beaver, hazards will persist and infrastructure will continue to deteriorate, exacerbating existing hazards and increasing the risk of additional hazards to develop over time.

OPTION B – REPAIR EXISTING FACILITIES AND EQUIPMENT AS NEEDED

Option B included the assessment of tank repair and painting, secondary containment installation/replacement, fuel pipeline and header repair/replacement, appurtenances repair/replacement, electrical repair/replacement, installation of a new retail gasoline tank and dispenser, installation of a new buried pipeline from TF2 to the generator house, provision of a new mobile tank trailer, and the included training and maintenance improvement recommendations. The intent of Option B is to implement repairs to existing facilities and equipment that would likely result in 10 or more years of remaining useable life and reduce risk to the environment and the life, health, and safety of residents and visitors of the community.

Based on historical fuel use records and the method and frequency of fuel delivery, a surplus of fuel storage capacity exists at the Village of Beaver. It is recommended that the existing total capacity of approximately 80,350 gallons at TF1 and TF2 be reduced to 39,200 gallons.

In developing the Option B cost estimate, costs were provided for each of the repair elements mentioned above, resulting in a total cost of $680,670. However, tank repair and painting is not recommended as the tanks are in relatively good condition and do not appear to require repair or painting to achieve 10 or more years of remaining useable life. The installation of new secondary containment would provide a safeguard for continued use of the older tanks. In addition, buried fuel pipeline repair/replacement is not recommended, rather implementing annual pneumatic pressure testing is recommended to ensure that the pipeline is not leaking.

The repairs recommended for Option B, excluding repairs for the TF1 school tanks, include secondary containment installation/replacement, airstrip fill header repair/replacement, appurtenances repair/replacement, and electrical repair/replacement at an estimated cost of $454,305. If repairs resulted in a maximum useable lifetime of 15 years, the repair cost per year of useable lifetime would be approximately $30,000 per year.

OPTION C – NEW CODE-COMPLIANT TANK FARMS

Installation of new code compliant TFs to replace existing infrastructure in the Village of Beaver would significantly reduce or eliminate risks to the environment and the life, health, and safety of residents and visitors of the community by eliminating many of the existing hazards present at the facilities in their current condition. New code compliant TFs installed in the village would be

designed to operate for the next 20 to 40 years before requiring major maintenance overhaul or replacement. Based on historical data provided by the AEA, and applying a construction cost inflation rate of 3 percent, the cost of new code compliant TFs resulting in 42,800 gallons of fuel storage capacity would range from approximately $1,112,800 to 1,455,200. If a design life for new TFs of 40 years is assumed, the construction cost for new TFs per year of design life, using the high value in the cost estimate range, would be approximately $36,380 per year.

OVERALL RECOMMENDATION

The overall recommended bulk fuel facility upgrade alternative is Option B. Implementing Option B would meet the AEA Bulk Fuel Upgrade Program objective of reducing or eliminating risks to the environment and the life, health, and safety of residents and visitors of the community in a cost-effective manner. In addition, Option B provides a better value assuming repair would result in a cost of approximately $30,000 per year for 15 years versus the construction cost of new TFs at $36,380 per year for 40 years.

2016 BULK FUEL UPGRADES LETTER REPORT
BEAVER, ALASKA

1.0 COMMUNITY OVERVIEW

1.1 LOCATION AND ACCESS

The Village of Beaver is located on the north bank of the Yukon River approximately 60 miles west of Fort Yukon, Alaska and approximately 105 miles north of Fairbanks, Alaska. The Village of Beaver is accessed by riverboat, airplane, and barge service (Yukon Cargo). Historically the barge landing was adjacent to the central portion of the village infrastructure. The barge landing has moved approximately one mile downstream from the village due to sedimentation in the channel near the central portion of the village infrastructure. There is no existing road system that connects the village to any other communities. A Beaver Village vicinity map is presented in Appendix A as Drawing A-01.

The TF1 site is located south of the Yukon Flats School District (YFSD) Cruikshank School in Beaver, Alaska. The site is accessed by C Street. The site is located in Township 18 North, Range 02 East of the Fairbanks Meridian; at 66.3596 degrees north and -147.3967 degrees west in WGS 1984 decimal degree coordinates based on locating the site in Google Earth Pro™. The site vicinity is shown on Drawing A-02 and investigation locations are shown on Drawing A-03.

The TF2 site is located off of C Street, south of the airstrip and directly west of the Cruikshank School in Beaver, Alaska. The site is located in Township 18 North, Range 02 East of the Fairbanks Meridian; at 66.3605 degrees north and -147.3986 degrees west in WGS 1984 decimal degree coordinates based on locating the site in Google Earth Pro™. The site vicinity is shown on Drawing A-02 and investigation locations are shown on Drawing A-03.

1.2 HISTORY AND CULTURE

Beaver is described to be a population of Gwich'in/Koyukuk Athabascan and Inupiat Eskimo residents who live a subsistence lifestyle. The settlement of Beaver was established by miners that were headed north to the Chandalar region in 1907. A trail was constructed from the Beaver settlement to Caro on the Chandalar River by the Alaska Road Commission. A store was established in 1910 in Beaver to provide goods to the miners who were heading north. In 1913 a post office was established and further development continued throughout the 1920s. In 1928 the Cruikshank school was constructed followed by an airstrip in the 1930s (ADCCED, 2016).

1.3 ENVIRONMENTAL CONDITIONS

1.3.1 FLOOD HAZARDS

The last major flood event that Beaver experienced was in 1992. The elevation of the river rose to 356.0 feet above mean sea level (AMSL). A flood event during 1958 raised the Yukon River to 358.1 feet AMSL. The highest flood event on record for Beaver occurred during 1948 when the Yukon River rose to 362.5 feet AMSL. Therefore the recommended building elevation for Beaver is 365.5 feet AMSL. The majority of the buildings in the village are constructed at 0.3 feet to 5.9 feet below

the recommended building elevation. There is no major flood hazard for the tank farm sites excluding the worst case scenario of a 100-year flood event (USACE, 2011).

1.3.2 EROSION HAZARDS

Beaver is located at a bending and meandering section of the Yukon River. The village is located on the northern shore cut bank of the river which is the location of the predominate erosion for this section of the river. The cut bank shore varies from gradual beaches to vertical bluffs that are up to 10 feet above the normal river water level. Localized erosion of the river bank has been mainly caused by natural river flow, ice jams, spring breakup, and seasonal flooding. A major flood or erosional event could potentially pose a low erosional hazard threat to the community due to the numerous buildings, roads, and infrastructure located within close proximity to the Yukon River.

1.3.3 POTENTIAL CLIMATE CHANGE IMPACTS OVER 10 YEARS

Accelerated permafrost thawing, active layer thickening, and ground subsidence could yield a potentially accelerated erosion rate of the river bank over the next decade. Extreme weather events could also impose unique impacts on the village of Beaver. There are many climatic variables such as seasonal mean temperature, rainfall, and snowfall which dramatically contribute to various adverse impacts. Climate change could increase the velocity of river flow, frequency of ice jams, intensity of spring breakup, and duration of seasonal flooding producing adverse erosional impacts to the village of Beaver.

1.4 LOCAL POINTS OF CONTACT

Relevant local points of contact, and associated TFs, are listed in Table 1-1 below.

TABLE 1-1: LOCAL POINTS OF CONTACT

Contact Name	Organization / Title	Telephone Number	Associated TF
Rhonda Pitka	BVC / First Chief	907.628.6126	TF1 and TF2
Wilma Pitka	BVC / Tribal Administrator	907.628.6126	TF1 and TF2
Kyle Wiehl	BVC / Tank Farm Operator	907. 628.6126	TF2
Tony Peter	YFSD / Maintenance Director	907.662.2515	TF1
Jay Schrock	YFSD / Tank Farm Operator	907.662.2515	TF1
Clifford Adams	ADOT&PF / Airstrip Maintenance	907.628.6622	--

1.5 SITE VISITS AND COMMUNITY INVOLVEMENT

Prior to conducting the site visit, several local points of contact were notified of the visit and its purpose via telephone. Communication records of these phone conversations are presented in Appendix B.

A site visit was conducted on August 5, 2016 by Will Rhodes (R&M), who was accompanied by his subcontractor Keith Rousseau (Inland Petroservice, Inc.) for repair/retrofit assessment support. Mr. Rhodes verified existing tank farm infrastructure and assessed its general condition. Photographs from the site visit are presented in Appendix C.

Mr. Rhodes engaged the local stakeholders and tank farm owners providing a general overview of the AEA Bulk Fuel Upgrades Program and the intent of the 2016 Bulk Fuel Upgrades Letter Report Project. Local stakeholders shared relevant community information, which has been incorporated into this report, useful for planning bulk fuel upgrades in the village.

1.6 LOCAL LABOR SKILLS

Local labor skills in the Village of Beaver were discussed with the BVC First Chief – Rhonda Pitka. Ms. Pitka indicated that local labor skills include two carpenters, one heavy equipment operator, two mechanics, and several general laborers. Ms. Pitka provided BVC labor rates listed below.

- Mechanic: $28.00 per hour
- Heavy Equipment Operator: $30.00 per hour
- General Laborer and Carpenters: $25.00 per hour

1.7 LOCAL CONSTRUCTION EQUIPMENT

Local construction equipment was discussed with Alvin Weiner during the site visit conducted on August 5, 2016. A list of local construction equipment is provided below.

- Backhoe: Case 580C
- Dump Truck: International
- Front-end Loader
- Bulldozer: currently not functional

Multiple requests were made Rhonda Pitka, First Chief, for information regarding local construction equipment, local labor, rates, etc., and little feedback was received. Ms. Pitka initially deferred to Clifford Brown, the local Alaska Department of Transportation and Public Facilities (ADOT&PF) airport maintenance contract holder, to answer questions regarding local construction equipment. Mr. Brown indicated that the loader and grader owned by ADOT&PF, stored in the airstrip maintenance building, were for use on ADOT&PF airport property only. Mr. Brown could not provide details on any additional local construction equipment.

2.0 EXISTING TANK FARMS

The Village of Beaver maintains two TFs that are eligible for upgrade assistance and included in this report. The two tank farms are listed below:

- TF1: YFSD/BVC – Cruikshank School
- TF2: BVC – Generator House diesel#1/heating oil

Note that TF1 is shared by the BVC and the YFSD; however BVC tanks at TF1 are not-in-service (NIS). These TFs are described in detail in the *2015 Bulk Fuel Assessment Report –Beaver, Alaska* (ERM, 2015), provided in Appendix D. A Site plan for TF1 and TF2 is presented in Appendix A, Drawing A-03. Photographs of the existing TFs are included in Appendix C.

2.1 2015 BULK FUEL ASSESSMENT UPDATE

Information contained in the 2015 Bulk Fuel Assessment Report was field-verified for accuracy during the August 2015 site visit. TF infrastructure descriptions in the 2015 report were determined to be accurate and no apparent changes had been made to the infrastructure over the past year. The only relevant updates include changes in contact information and additional detail regarding retail gasoline management. Current relevant contact information is detailed in Table 1-1 and Table 2-1.

The BVC transfers gasoline from the airstrip to the dilapidated "gasoline shack" using three 300-gallon, steel, single-wall tanks. The 300-gallon tanks are mounted on deteriorated home-made wooden skids. Gasoline is transferred from the 300-gallon tanks to 55-gallon drums in the gasoline shack via hand pump. Fuel is then transferred from the drums to end users via hand pump into 5-gallon gas cans.

2.2 RETAIL FUEL SALES

Retail fuel sales are provided by the BVC. The BVC sells retail diesel #1/heating oil from TF2. Diesel #1/heating oil is transferred from TF2 to end users using BVCs trailer-mounted 500-gallon tank, or with 55-gallon drums on snow machine or all-terrain vehicle trailers. As noted in Section 3.1 above, retail gasoline is sold from 55-gallon drums stored in the gas shack.

2.3 PIPELINES AND HEADER SYSTEMS

Pipelines and a single product header system support fuel transfer to and from TF1 and TF2. The single product header system, located near the airstrip, consists of an approximately 10-foot long, 3-inch rubber fuel hose with cam-lock fittings and a brass gate valve. No catch-basin or spill containment of any type is located at the header fill point.

The header system is connected via cam-lock fitting to a 3-inch welded steel pipeline that runs approximately 360-feet, mostly below grade, to a tee with flanged steel gate valves near TF2. From the tee the pipeline runs west approximately 20-feet to the TF2 manifold, and southeast approximately 570-feet to the TF1 manifold. A 2-inch steel pipeline with threaded fittings runs approximately 70-feet, mostly below grade, from the school tank manifold to the school's maintenance shop. An abandoned pipeline runs from the TF1 BVC tanks, that are NIS, south approximately 260-feet to the washeteria.

The approximate locations of the header system and pipelines are depicted on Drawing A-03. Photographs of the header system and portions of the pipelines are presented in Appendix C.

2.4 TANK FARM OWNERS AND CONTACT INFORMATION

TF owners, representatives, and contact information is summarized in Table 2-1 below.

TABLE 2-1: TANK FARM OWNERS AND CONTACT INFORMATION

Tank Farm	Owner	Representative	Address	Phone Number
TF1 – School	YFSD	Tony Peter	PO Box 350 Fort Yukon, Alaska 99740	907.662.2515
TF1 – BVC Tanks NIS	BVC	Rhonda Pitka	PO Box 24029 Beaver, Alaska 99724	907.628.6126
TF2 – Power Plant				
"Gasoline Shack"				

NOTE:
TF1 is shared by the BVC and the YFSD.

2.5 ADEC CONTAMINATED SITES SUMMARY

The two existing TFs discussed in this report are associated with active contaminated sites. Contaminated site summaries presented below are based on information obtained from the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program Database (ADEC, 2016).

2.5.1 TF1 VICINITY CONTAMINATED SITE

The ADEC Site Name for the contaminated site in the vicinity of TF1 is "Beaver School Tank Farm," and the Hazard ID Number is 3944. Area wide soil contamination at this location has occurred due to multiple point-sources; initial site characterization activities commenced in 2001. The above ground fuel storage tanks are located approximately 550 feet from the Yukon River. The Village of Beaver drinking water well is located approximately 425 feet to the south of the Beaver School Tank Farm contaminated site.

Site contaminants of concern include diesel range organics (DRO), gasoline range organics (GRO), and fuel-related volatile organic compounds (VOC). DRO soil contamination extended to 8.5 feet below ground surface (bgs). Roughly 5,600 square feet of surface soil contamination was documented, resulting in an estimated 1,640 cubic yards of contaminated soil. Additionally, 400 square feet of surface-soil contamination was documented along the washeteria pipeline that extended to 7.5 feet bgs, and is estimated to encompass 110 cubic yards of contaminated soil. No site remediation has occurred.

The BVC applied to ADEC in 2009 for and ADEC Brownfield Assessment; the Beaver School Tank Farm is now a Brownfield Site.

2.5.2 TF2 VICINITY CONTAMINATED SITE

The ADEC Site Name for the contaminated site in the vicinity of TF2 is "Beaver Generator Building Fire," and the Hazard ID Number is 4612. The Beaver generator building sustained a structure fire in July of 2007 and was completely destroyed. A volume of 150 gallons of fuel was reported to have

spilled in 2001 and potentially burned during the fire, but it is unknown how much fuel was actually lost. The Beaver Generator Building Fire site is located approximately 840 feet north of the Yukon River.

The site is also known as the Beaver Joint Utilities Tank Farm. Initial site characterization efforts in 2001 indicate that site contaminants of concern included DRO, GRO, and VOC. Soil contamination was documented in various locations surrounding the TF. The site is in the Brownfield program; no remediation has occurred to date.

2.6 FUEL TRANSFER CAPABILITIES AND METHODS

The YFSD and BVC transfer fuel from the airstrip header to TF1 and TF2, respectively, through a buried pipeline. The YFSD then transfers fuel through a buried pipeline from TF1 to the school maintenance building. The header system and pipelines are discussed in more detail in Section 2.3.

Currently the BVC transfers diesel #1/heating oil from TF2 to their generator house intermediate tank using a 500-gallon, steel, single-wall tank strapped to a double-axle utility trailer. Diesel #1/heating oil is transferred from TF2 to end users for retail sale using BVCs trailer-mounted 500-gallon tank, or with 55-gallon drums on snow machine or all-terrain vehicle trailers.

The BVC transfers gasoline from the airstrip to the dilapidated "gas shack" using three 300-gallon, steel, single-wall tanks. The 300-gallon tanks are mounted on deteriorated home-made wooden skids. Gasoline is transferred from the 300-gallon tanks to 55-gallon drums in the gas shack via hand pump. Fuel is then transferred from the drums to end users via hand pump into 5-gallon gas cans.

2.7 HISTORICAL FUEL USE AND 10-YEAR FORECAST

Historically, diesel #1/heating fuel and gasoline have been used in the Village of Beaver. Diesel #1/heating fuel has been, and is currently, used for power generation using diesel generators, space heating with oil heaters (Toyostove® or Monitor®), and heavy equipment operation. Gasoline has been, and is currently, used to power automobiles, snow machines, all-terrain vehicles, boat motors, small engines, etc.

Everts Air Cargo (EAC) and Alaska Air Fuel (AAF) provided fuel delivery records for fuel purchased by the YFSD (TF1) and the BVC (TF2 and gasoline) from January 2013 through July 2016. From January 2013 through 2015 the total annual average volume of diesel #1/heating fuel and gasoline delivered to Beaver was approximately 45,500 gallons and 2,300 gallons, respectively. Table 2-2 below shows the monthly delivery volumes by fuel type and yearly totals for each organization.

TABLE 2-2: BEAVER FUEL DELIVERIES – JANUARY 2013 THROUGH JULY 2016

BVC (TF2 and gasoline)			YFSD (TF1)	
Month / Year	Diesel #1 (gallons)	Gasoline (gallons)	Month / Year	Diesel #1 (gallons)
2/13	4,650	--	1/13	5,640
3/13	4,470	--	9/13	1,000
5/13	4,470	--	10/13	2,150
8/13	3,200	--	10/13	11,000
9/13	4,650	--	11/13	2,000
11/13	9,000	--	-	-
2013 Total	**30,440**	--	**2013 Total**	**21,790**
1/14	5,000	--	11/14	8,690
2/14	4,000	--	--	--
4/14	4,000	--	--	--
6/14	4,000	--	--	--
7/14	650	350	--	--
9/14	4,650	--	--	--
10/14	2,000	1,000	--	--
11/14	4,000	--	--	--
12/14	4,000	--	--	--
2014 Total	**32,300**	**1,350**	**2014 Total**	**8,690**
1/15	4,645	--	4/15	4,000
2/15	4,350	600	9/15	2,000
3/15	4,000	--	12/15	6,000
5/15	3,000	--	--	--
6/15	1,650	650	--	--
8/15	2,300	350	--	--
9/15	1,500	850	--	--
10/15	4,000	--	--	--
11/15	1,500	300	--	--
12/15	4,500	500	--	--
2015 Total	**31,445**	**3,250**	**2015 Total**	**12,000**
1/16	4,000	--	1/16	4,000
2/16	3,350	650	--	--
4/16	3,000	--	--	--
5/16	5,350	1,000	--	--
7/16	1,800	1,400	--	--
2016 Total	**17,500**	**3,050**	**2016 Total**	**4,000**

NOTES:
In some instances more than one fuel delivery occurred in a single month.
Red = AAF delivery.
-- = Not Applicable

Census data from the Alaska Department of Commerce, Community, and Economic Development (ADCCED) indicates that the Village of Beaver population in 1990, 2000, and 2010 was 103, 84, and 84, respectively. From 1990 to 2000 the population decreased by approximately 18 percent, and from 2000 to 2010 the population remained the same. If the population remains close to what it has been for the past three decades, fuel consumption should remain roughly the same or slightly decrease in the next 10 years.

State funding will not be disbursed to a school district for schools with less than 10 students enrolled following the first week of school during a new school year. The YFSDs current policy is to close schools in their district that do not meet the minimum 10-student enrollment threshold. The Cruikshank (Beaver) School has had 11 and 10 children in attendance during the 2014/2015 and 2015/2016 school years, respectively. If the school is closed due to a lack of enrollment, the YFSD will winterize all water lines in the school facilities with glycol and discontinue heating the facilities. If this situation occurs, heating oil and bulk storage tanks will not be required at the Cruikshank School.

2.8 METHODS AND FREQUENCY OF FUEL DELIVERY

Based on the Beaver fuel delivery record provided in Table 2-1 and discussions with EAC, diesel #1/heating oil is delivered roughly once every one to two months and gasoline is delivered once every two months or more. Quantities delivered generally range from 1,000 gallons to 5,000 gallons within a given month. Occasionally the YFSD will receive larger quantities, 8,000 gallons to 11,000 gallons, within a single month driven by the allocation of funding.

According to EAC a maximum 4,650 gallons of fuel can be delivered to the village in one trip; in some instances more than one fuel delivery is made in a single month as noted in Table 2-2. The total delivery volume may be split between diesel #1/heating oil and gasoline, or other fuel types, as EAC is equipped with 1,800 and 800 gallon tanks that can be arranged in various configurations to accommodate requests for variable amounts of diesel #1/heating oil and gasoline in a given order. AAF can deliver a maximum 3,200 gallons of diesel #1/heating oil in one trip and a maximum of 3,400 gallons of gasoline in one trip; delivery volume may be split between diesel #1/heating oil and gasoline, or other fuel types.

3.0 BULK FUEL STORAGE IMPROVEMENT ALTERNATIVES

3.1 OPTION A: NO ACTION

The existing bulk fuel storage facilities and equipment at TF1 and TF2 range from 20 to 40 or more years old. The current configurations and condition of these facilities result in code violations ranging from minor to major. Ultimately the existing facilities in their current condition pose medium to high risk to the environment and the life, health, and safety of residents and visitors of the community.

The current condition of TF1 and TF2 pose medium to high risks that could result from hazards summarized in the list below.

- Limited or no lighting
- Lack of security fence
- Tripping hazards
- Lack of regulatory signage
- Lack of secondary containment
- Unlocked valves
- Improper valve material
- Fuel leaks and past releases
- Missing spill response equipment
- Missing fire extinguishers
- No cathodic protection (CP) where needed
- Inadequate or missing fill-point drip pan
- Inadequate or missing tank saddles
- Inadequate or missing tank appurtenances
- Inadequate or missing overfill protection
- Threaded piping

Without bulk fuel upgrade action in the Village of Beaver, the above listed hazards will persist and infrastructure will continue to deteriorate, exacerbating existing hazards and increasing the risk of additional hazards to develop over time.

3.2 OPTION B: REPAIR EXISTING FACILITIES AND EQUIPMENT AS NEEDED

Repairing existing facilities and equipment as needed in the Village of Beaver will reduce risk to the environment and the life, health, and safety of residents and visitors of the community and eliminate many of the existing hazards present at the facilities in their current condition. To reduce risk and existing hazards at TF1, TF2, and the gasoline shack; facility and equipment repair, retrofitting, and/or replacement could be implemented. Facility repairs would be aimed at extending the operational longevity of existing infrastructure for 10 or more years.

Based on historical fuel use records and the method and frequency of fuel delivery, TF1 and TF2 currently maintain an excess of fuel storage capacity. To meet the fuel storage needs of the YFSD Cruikshank School at TF1, the capacity could be reduced by 30,800 gallons. In addition, the three tanks NIS at TF1 owned by the BVC could be decommissioned. To meet the diesel #1/heating oil storage needs of the BVC at TF2, the capacity could be reduced by approximately 10,350 gallons. These capacity reductions would significantly decrease the overall bulk fuel facility repair cost for the Village of Beaver. With the proposed reductions in capacity, the tanks at each TF considered for improvement alternative option B include:

- TF1: Tanks #2, #4, and #5 for a total of 18,500 gallons
- TF2: Tanks #1 and #2 for a total of 20,700 gallons

Tank parameters are detailed in the 2015 Bulk Fuel Assessment Report (ERM, 2015) located in Appendix D.

In addition, a Fireguard® tank and dispensing pump could be installed for retail gasoline sales to replace the gasoline shack. An 800-gallon mobile tank trailer could be purchased to replace the current method used to transfer retail gasoline, which consists of skidding 300-gallon tanks. An alternative to transferring diesel #1/heating oil from TF2 to the generator house intermediate tank with a mobile tank trailer would be to install a buried, coated, 1.5-inch, welded steel pipeline with CP. A dispensing pump could be installed at TF2 to provide retail diesel #1/heating oil.

Facility and equipment repair, retrofitting, and/or replacement options include tank repair and painting, secondary containment installation/replacement, fuel pipeline and header repair/replacement, appurtenances repair/replacement, and electrical repair/replacement. Additionally, improving the facility owner and operator training and maintenance program may assist in reducing risk and hazards associated with existing operational protocols. Equipment repair, retrofitting, and/or replacement options as well as training and maintenance improvement recommendations are discussed below.

3.2.1 TANK REPAIR AND PAINTING

Tank repair and painting would include surface preparation followed by painting of all tanks, piping, fittings, and valves as needed. Primer and top coats would be applied in accordance with the manufacturers written instructions. The approximate surface area to be painted is listed by TF below.

- TF1: 1,500 square feet
- TF2: 1,580 square feet

Surface preparation would be performed in accordance with the Society for Protective Coatings (SSPC) surface preparation standard SSPC-SP3 Power Tool Cleaning. Power tool cleaning would be employed to remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter by power wire brushing, power sanding, power grinding, power tool chipping, and power tool descaling.

Tank painting would consist of applying two coats of primer and two finish coats. Priming would be achieved by applying two coats, four mils dry film thickness (DFT) each, of Devoe® Bar-Rust 236 (or equivalent). Following application of the primer, finish coats would consist of applying two coats, four mils DFT each, of Devoe® Devthane 349QC polyurethane finish (or equivalent).

Painting of piping, fittings, and valves would consist of applying two coats of primer and two finish coats. Priming would be achieved by applying two coats, four mils DFT each, of Devoe® Devguard 4160 (or equivalent). Following application of the primer, finish coats would consist of applying two coats, four mils DFT each, of Devoe® Devguard 4160 gloss enamel finish (or equivalent).

The majority of tanks in the Village of Beaver appear to be in relatively good condition, and may not require painting to extend their operational longevity for 10 or more years.

3.2.2 SECONDARY CONTAINMENT REPAIR/REPLACEMENT

Secondary containment exists at TF2 and appears to be liquid-tight as it has been observed to contain a significant volume of water for over a decade. The containment at TF2 would be dewatered, debris and vegetation would be removed, and a sump pump would be installed. Vegetation growing around the containment berm would be removed and the chain-link security fence would be repaired

No secondary containment exists at TF1. New secondary containment berms and liners would be installed to eliminate the risk of off-site migration of fuel in the event of a release from the facility. Secondary containment structure materials would consist of gravel, engineered membrane liner, non-woven geotextile fabric, sand bags, and a sump. In addition 8-foot tall chain-link security fencing with vehicle access and man gates would be installed around the perimeter of each facility to protect the containment and equipment inside.

To install the secondary containment structure site preparation would be performed as needed including clearing, grubbing and grading. A rectangular gravel containment berm would be constructed of sufficient size to contain 110 percent of the contents of the single largest tank within the perimeter of the berm. Gravel could be obtained from a material site located north of the village on land owned by the ADOT&PF. The material site is depicted on Drawing A-02.

Geotex® 1291 non-woven fuel-resistant geotextile fabric would be used in conjunction with Cooley CoolThane® L1023 engineered membrane liner to constitute the containment liner system. A base layer of geotextile fabric would be laid across the perimeter of the containment berm, followed with the membrane liner, and an additional top layer of geotextile fabric. A layer of gravel would be placed and compacted within the interior perimeter of the berm and a sump would be installed in one corner of the containment area. Circular-woven polypropylene sandbags rated for 1600 hours of ultraviolet light exposure protection would be used to secure the liner system from the interior perimeter, over the top of the berm, and toward the liner extents at the outer perimeter of the berm. Sand and gravel to fill the sandbags could be obtained from the ADOT&PF material site.

The approximate square feet of liner material and volume of aggregate material required to construct a secondary containment structure at TF1 is listed below.

- TF1 Liner Material: 1,800 square feet
- TF1 Aggregate Material: 115 cubic yards

3.2.3 FUEL PIPELINE AND HEADER REPAIR/REPLACEMENT

The fuel pipeline and header system configuration is described in Section 2.3. The age of the buried fuel pipelines is estimated to be at least 20 years old and could be as much as 40 years old or more. The condition of the buried pipelines is unknown. Pressure testing would be required to determine if the buried pipelines are leaking.

Currently the buried pipeline is not protected against corrosion. Raising the pipeline above grade is possible, however it would be at risk of damage by motor vehicles and heavy equipment travelling, in some cases, less than 10 feet from the existing alignment.

A CP system could be installed to protect the buried pipelines. Two CP options exist for the buried pipelines including galvanic and impressed current systems. A number of key variables that determine the type of CP system needed, and greatly affect the installation cost, include:

- Soil resistivity data
- Whether the pipe is coated, e.g. high density polyethylene jacket
- Whether the piping is isolated, e.g. with dielectric bushings
- The proximate of different piping sections requiring CP

Typically, if piping is coated and isolated, a galvanic system can likely be used. If the piping is not coated and not isolated, an impressed current system is typically required. The buried piping throughout the Village of Beaver does not appear to be coated or isolated; specific CP requirements can be determined through onsite testing. The required elements for CP installation would include onsite predesign testing, CP design, materials, and commissioning. An alternative to retrofitting the buried pipelines with CP, would be to institute an annual pneumatic pressure testing program to verify that buried pipelines are not leaking.

A new buried, 1.5-inch, coated, welded steel pipeline with CP could be installed to transfer fuel from TF2 to the intermediate tank at the generator house. This would eliminate the need to transfer diesel #1/heating oil using a mobile tank trailer.

The airstrip fuel fill header replacement would include the installation of a new swing check valve and a stainless steel ball valve. The header fill point would be enclosed in a fuel cabinet with a 90 gallon capacity.

3.2.4 APPURTENANCES REPAIR/REPLACEMENT

The appurtenances that would be replaced or newly installed vary by tank and/or facility.

The tanks at TF1 would be retrofitted with 8-inch emergency vents, fire-safe steel ball valves, clock-type level gauges, and manways. Threaded water draw ports would be replaced with flanged nozzles and new 2-inch steel ball valves with a blind flange.

The tanks at TF2 would be retrofitted with an 8-inch emergency vents, fire-safe steel ball valves, clock-type level gauges, and manways. In addition, one of the tanks could be retrofitted with a top-draw port, anti-siphon valve, and piping to feed a dispensing pump located outside of the containment area. The dispensing pump would be used for retail diesel #1/heating oil sale and would replace the 2-inch rubber hose and 500-gallon stationary tank. Steel guard posts would be installed adjacent to the dispensing pump for traffic protection.

3.2.5 ELECTRICAL REPAIR/REPLACEMENT

No electrical exists at TF1 and TF2. The only new electrical proposed for TF1 and TF2 would be wiring for lighting at these facilities and a dispensing pump at TF2. Electrical would be required for a dispensing pump associated with a new retail gasoline tank.

3.2.6 TRAINING AND MAINTENANCE IMPROVEMENT RECOMMENDATIONS

To improve bulk fuel facility training and maintenance, the Village of Beaver could receive support from Rural Alaska Fuel Services (RAFS), which is a not-for-profit corporation that was developed to assist in the operation and maintenance of rural Alaska bulk fuel facilities. Specific services offered by RAFS that would be beneficial for improving training and maintenance at the Village of Beaver include:

- Facility operations and maintenance training
- Assistance to local TF owners in preparing operations and maintenance manuals
- Assistance to local TF owners in preparing spill prevention and emergency action plans
- Assistance to local fuel operators in establishing and maintaining facility records
- Assistance to local fuel operators in establishing and maintaining regular testing and inspection protocols
- Assistance to local fuel operators in establishing and maintaining facility security

3.2.7 COST ESTIMATE

The cost estimate in Table 3-1 below for Option B: Repair Existing Facilities and Equipment, was developed through assessing existing facilities and equipment to determine they types of repair required and to address the elements specified in the AEA Request for Proposal 17003. Costs were obtained from local vendors, contractors, and freight companies to supply materials, repair services, and freight delivery services. Note that not all repair options listed in the estimate are recommended; costs for repairs that are not recommend are for informational purposes only. Assumptions made in developing the cost estimate are listed below.

- Local (Village of Beaver) labor and equipment will be utilized where possible
- Materials and equipment delivery to the Village of Beaver will be possible by barge
- Two barge loads and up to three truckloads are assumed for transporting materials
- Aggregate material will be provided from the ADOT&PF material site; the cost below is assumed
- No rates for heavy equipment were provided by the BVC; heavy equipment will be rented
- Annual pressure testing of buried pipelines will be employed vs. CP system installation

TABLE 3-1: OPTION B: REPAIR EXISTING FACILITIES AND EQUIPMENT COST ESTIMATE

Component / Description	Tank Farm	Quantity	Unit (EA, LF, SF, LS, CY, hr,)	Material or Unit Cost	Labor Cost	Total Cost
Tank Repair and Painting						
Tank Preparation and Painting (2-man crew, 10 days)	TF1	1,500	SF	$25/SF		$37,500
	TF2	1,580				$39,500
Travel, Lodging, Meals	All	1	LS			$6,000
					Tank Repair and Painting Total	**$83,000**
Secondary Containment Repair/Installation						
Liner	TF1	1,800	SF	$1.90/SF		$3,420

Component / Description	Tank Farm	Quantity	Unit (EA, LF, SF, LS, CY, hr,)	Material or Unit Cost	Labor Cost	Total Cost
Geotextile Fabric (15 foot widths with 3-feet overlap at joints)	TF1	2,020	SF	$0.27/SF		$545
Sand Bags (one bale of 1000)		1	EA	$250 per bale		$250
Aggregate Material		115	CY	$3.50/CY		$400
Chain-link Security Fence		200	LF	23.00/LF		$4,600
Secondary Containment Labor (Local labor, 4-man crew, 18 days)		576	Hr	$25/hr		$14,400
Secondary Containment Repair/Installation Total						**$23,615**
Fuel Pipeline and Header Repair/Replacement						
Galvanic CP System (Approximately 1,100 feet of pipe)	All	Predesign Testing: $6,200; CP Design: $4,900; Materials: $5,500; Commissioning: $7,500				$24,100
Impressed Current CP System (Approximately 1,100 feet of pipe)		Predesign Testing: $6,200; CP Design: $6,800; Materials: $18,000; Commissioning: $7,500				$38,500
Pneumatic Pressure Testing (1-man, 2 days, 2 lines, annually)		$1,250/day; $500/line; $600/travel cost				$4,100/yr
Header Repair (fuel cabinet, swing check valve, ball valve)		1	LS	$4,000	$2000	$6,000
New 1.5-inch pipeline from TF2 to generator house (approx. 700 feet)	TF2	1	LS	$41,570	$35,900	$77,470
Fuel Pipeline and Header Repair/Replacement Total (assumes annual pressure testing versus CP)						**$87,570**
Appurtenances Repair/Replacement						
Tanks (emergency vents, ball valves, level gauges, manways)	TF1	1	LS	$17,500	$20,700	$38,200
Tank (emergency vent, ball valve, level gauge, prevention valve, manway)	TF2	1	LS	$11,100	$14,400	$25,500
Retail Dispenser, piping, and valves		1	LS	$15,900	$11,400	$27,300
Equipment and Consumables	All	1	LS	$10,900		$10,900
Travel, Lodging, Meals	All	1	LS	NA		$8,000
Appurtenances Repair/Replacement Total						**$109,900**
Appurtenances Repair/Replacement Total Excluding TF1 (School)						**$71,700**
Electrical Repair/Replacement						
Light and Electrical Installation	TF1	1	LS	$6,500	$4,000	$10,500
Light and Electrical Installation	TF2	1	LS	$6,500	$4,000	$10,500
Electrical Repair/Replacement Total						**$21,000**
Electrical Repair/Replacement Total Excluding TF1 (School)						**$10,500**
New Retail Gasoline Tank and Mobile Trailer						
2,000-gallon Fireguard® Tank with Dispensing Pump	New	Tank and top-fill package: $21,207 Retail dispensing package: $23,738				$44,945

Component / Description	Tank Farm	Quantity	Unit (EA, LF, SF, LS, CY, hr,)	Material or Unit Cost	Labor Cost	Total Cost
800-gallon Mobile Tank Trailer with Dispensing Pump		1	EA	$36,200		$36,200
New Retail Gasoline Tank and Mobile Trailer Total						**$81,145**
Freight and Heavy Equipment						
Trucking (Fairbanks to Circle)	All	Up to three loads Maximum capacity of 40,000 lbs/load				$6,000
Barge (Circle to Beaver)	All	Two trips Maximum capacity of 34,000 lbs/trip, $0.40/lb				$27,200
Heavy Equipment Rental (2 months)	All	1	LS	$30,000		$30,000
Freight and Heavy Equipment Total						**$63,200**
Option B Cost Estimate Subtotal						$469,430
10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)						$211,240
Option B Cost Estimate Total						**$680,670**
Option B Cost Estimate Subtotal Without Tank Painting						$385,630
10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)						$173,500
Option B Cost Estimate Total Without Tank Painting						**$559,130**
Option B Cost Estimate Subtotal Without Tank Painting or TF1 (School) Repair						$313,315
10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)						$140,990
Option B Cost Estimate Total Without Tank Painting or TF1 (School) Repair						**$454,305**

NOTES:
EA = each; LF = linear foot; SF = square foot; LS = lump sum; CY = cubic yard; hr = hour

3.3 OPTION C: NEW CODE COMPLIANT TANK FARM

Installation of new code compliant TFs to replace existing infrastructure in the Village of Beaver would be aimed at reducing risk to the environment and the life, health, and safety of residents and visitors of the community by eliminating many of the existing hazards present at the facilities in their current condition. New code compliant TFs installed in the village would be designed to operate for the next 20 to 40 years before requiring major maintenance overhaul or replacement. The proposed capacities and general characteristics of new code compliant TFs to replace existing TF1, TF2, a new gasoline storage tank, and a new mobile tank trailer are described below.

3.3.1 DESCRIPTION

The proposed capacities for new code compliant TFs in the Village of Beaver are based on historical fuel use records and the method and frequency of fuel delivery. Proposed capacities and tank configurations for each TF and owner are listed below.

- TF1 YFSD School: 20,000 gallons, two 10,000 gallon tanks
- TF2 BVC diesel #1/heating oil: 20,000 gallons, two 10,000 gallon tanks
- New retail gasoline storage tank and dispenser: 2,000 gallons, one 2,000 gallon tank

- New mobile tank trailer: 800 gallons, one 800 gallon gasoline trailer

The proposed new code compliant TF gross capacity in the Village of Beaver would be 42,800 gallons.

The general characteristics under consideration for new code compliant TFs that would be installed in the Village of Beaver include tank location, tank type and appurtenances, secondary containment, foundations, piping and appurtenances, electrical, and typical life, health, and safety protection features. All tanks, piping, valves, and associated equipment would be listed for the use for which they are intended, and would be used according to their listing. New code compliant TF general characteristics are listed below.

TANK LOCATION

Where practicable the tanks would be located:

- 25-feet from the nearest property line that may be built upon
- 25-feet from the nearest important building
- 25-feet from the nearest side of a public way
- 50-feet from dispensing device if tank is greater than 6000 gallons; no minimum distance from dispensing device if tank is 6,000 gallons or less

A Fireguard® tank would be utilized for the retail gasoline tank and dispensing pump, or if tank siting was required within 25 feet of an important building. Where practicable, tanks would not be located in a flood plain or area threatened by river erosion, and would not be sited within 100-feet of a drinking water well. Tanks would be protected against collision with steel guard posts, or other approved protection, if they are located in an area subject to vehicular impact.

TANK TYPE AND APPURTENANCES

All tanks would either be Underwriters Laboratories (UL) listed or an approved equivalent. Preferably tanks would be constructed with integral secondary containment.

All tanks would be constructed with normal venting to prevent over-pressure or vacuum from damaging the tank during product fill or withdraw. All tanks, the interstitial space of a secondary containment tank, and each chamber of a multiple chamber tank would be equipped with emergency relief venting to prevent rupture of the tank or chamber if it is exposed to uncharacteristic heat (fire). Tanks would contain a liquid level monitoring system for the primary tank, a continuous automatic detection system capable of detecting liquids in the interstitial space, an overfill protection device, and the tank fill opening would be equipped with a spill container capable of containing at least five gallons.

SECONDARY CONTAINMENT

Secondary containment would be provided for every tank. Secondary containment could consist of a liquid-tight dike with a capacity of 110 percent of the largest tank in the dike, or a double wall or self-diked tank. A diked containment area would contain a sump capable of removing accumulated liquids.

FOUNDATIONS

Where practicable, Tanks would be founded on non-frost susceptible gravel fill obtained locally from the CNC material site. The base fill and surface course would consist of the same material. Gravel would be placed in 8-inch to 12-inch lifts and compacted to a maximum density determined by ASTM D1557 (Modified Proctor Test). Tank supports would consist of concrete saddles, treated timber saddles, or a protected steel framework or skid system.

PIPING AND VALVES

All piping would be liquid-tight, properly labelled, and protected from corrosion. Aboveground piping would be substantially supported and protected from physical damage. Underground piping would be avoided. If underground piping is required, it would either consist of double wall construction or would be equipped with a galvanic or impressed current CP system.

The piping systems would be constructed with a sufficient number of valves to properly control the flow of fuel both in normal operation and in the event of physical damage. Typical valves that would be installed to properly control the flow of fuel include anti-siphon, check, pressure relief, solenoid, fusible link, gate, and ball valves. Couplings would be flanged to the maximum extent practical.

ELECTRICAL

All electrical wiring and equipment would be of the type specified by, and installed in accordance with, the National Fire Protection Association 70: National Electric Code. Electric conduit would be supported at code-required intervals. All equipment such as tanks, machinery, and piping would be bonded and grounded.

LIFE, HEALTH, AND SAFETY PROTECTION FEATURES

Additional life, health, and safety protection features would be employed at the new TFs to provide safeguards for the environment, and residents and visitors of the community. Features would include chain link security fencing with locked gates, locks on tank issue valves, adequate lighting, spill response equipment and fire extinguishers, and regulatory signs and labelling. Development of regulatory, training, and maintenance plans would be recommended.

3.3.2 PARTICIPANTS

The proposed new code compliant tank farms would replace existing TF1 and TF2, and would include a new retail gasoline storage tank and dispensing pump; no TF consolidations are proposed. In this case, the existing owners of TF1 and TF2 would be the participants in the construction of new TFs at these locations. The BVC would assume ownership of the new retail gasoline storage tank.

3.3.3 POTENTIAL SITES

Potential sites do not appear to be available or necessary for TF1 and TF2; new code compliant TFs could be constructed in the same general areas at existing TF1 and TF2.

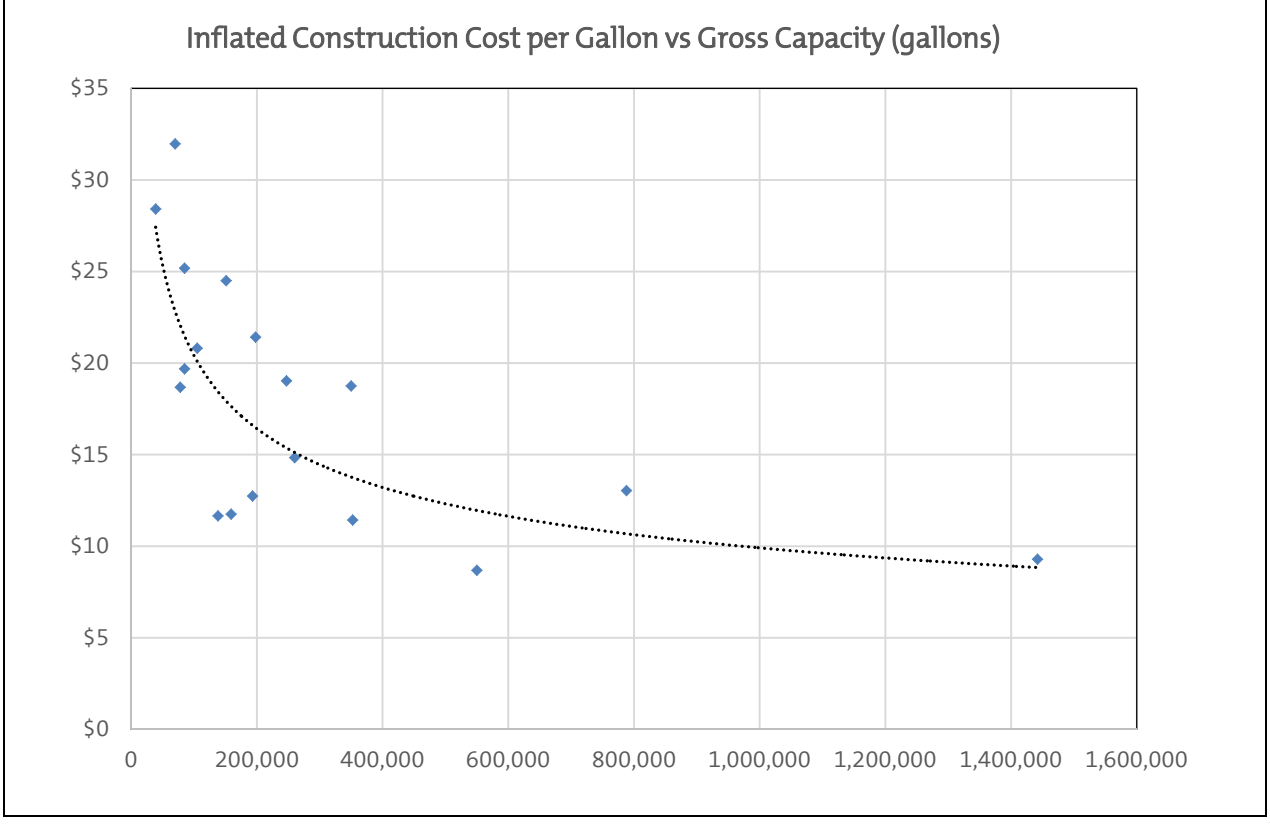
A new retail gasoline storage tank and dispensing pump could be sited in the general vicinity of the BVC Building or the generator house.

3.3.4 PRELIMINARY COST ESTIMATE RANGE BASED ON HISTORICAL DATA

The preliminary cost estimate range for the construction of new code compliant TFs in the Village of Beaver is based on historical data provided by the AEA. The data included the actual construction cost for the gross capacity of new TFs in 18 rural Alaskan communities from 2005 through 2015. The construction cost was divided by the gross constructed capacity to determine the construction cost per gallon during the year construction occurred. The cost per gallon during the year of construction for each village was then inflated to the year 2017 using a construction inflation rate of 3.0 percent. The new cost per gallon inflated to 2017 was plotted against the original gross capacity and a best-fit curve was applied to model the data. The data and plot are provided below in Figure 3-1.

FIGURE 3-1: HISTORICAL BULK FUEL FACILITY CONSTRUCTION COST DATA

Community	Year Construction Complete	Actual Cost	Gross Capacity (gallons)	Cost per gallon	Inflation Multiplier	Inflated Cost per gallon
Nanwalek	2005	$777,086	39,000	$19.93	1.43	$28.41
Tenakee Springs	2006	$1,616,380	70,000	$23.09	1.38	$31.96
Twin Hills	2011	$1,220,000	78,000	$15.64	1.19	$18.68
Pelican	2008	$1,640,000	85,000	$19.29	1.30	$25.17
Bettles	2012	$1,443,000	85,000	$16.98	1.16	$19.68
Perryville	2014	$2,000,000	105,000	$19.05	1.09	$20.81
Levelock	2010	$1,307,217	138,000	$9.47	1.23	$11.65
Shishmaref	2016	$3,591,306	151,000	$23.78	1.03	$24.50
Gustavus	2011	$1,564,220	159,000	$9.84	1.19	$11.75
Koliganek	2012	$2,120,000	193,000	$10.98	1.16	$12.73
Nunam Iqua	2014	$3,880,000	198,000	$19.60	1.09	$21.41
Ruby	2009	$3,709,255	247,000	$15.02	1.27	$19.02
Hoonah	2011	$3,230,158	260,000	$12.42	1.19	$14.83
Alakanuk	2012	$5,660,000	350,000	$16.17	1.16	$18.75
Seldovia	2007	$2,996,453	352,500	$8.50	1.34	$11.42
Emmonak	2015	$4,500,000	550,000	$8.18	1.06	$8.68
Stebbins	2014	$9,400,000	788,000	$11.93	1.09	$13.04
Unalakleet	2007	$9,961,170	1,442,000	$6.91	1.34	$9.28



The best-fit curve is described by the following equation:

$$C = 755.99g^{-0.314}$$

Where: g = the gross capacity
C = the construction cost per gallon in 2017

This equation was used to estimate a low construction cost per gallon. A high construction cost per gallon estimate was determined by adding 30 percent to the low construction cost per gallon estimate. The low and high construction cost per gallon estimates constitute the preliminary cost estimate range. For a proposed new code compliant TF gross capacity of 42,800 gallons the construction cost per gallon estimate range would be approximately $26 per gallon to $34 per gallon, and the total construction cost would be approximately $1,112,800 to 1,455,200.

If a construction inflation rate of 1.5 percent is substituted for the 3.0 percent rate used above, the construction cost per gallon estimate range would be approximately $23 per gallon to $30 per gallon, and the total construction cost would be approximately $984,400 to 1,284,000.

A number of assumptions regarding the preliminary cost estimate range are listed below.

- The cost estimate range accounts for differences in foundation type, variable subsurface conditions, tank and equipment selections, variable freight costs, etc.
- The cost estimate range does not account for design cost, which is generally about 10 percent to 15 percent of the construction cost.
- The cost estimate range does not account for the cost of site control and acquisition, if needed.
- The cost estimate range does not account for the cost of contaminated site management, remediation, tank decommissioning, etc.

4.0 RECOMMENDATIONS

Three alternatives were assessed to address the Village of Beaver bulk fuel storage facility situation and needs. The alternatives included:

- Option A – No Action
- Option B – Repair Existing Facilities and Equipment as needed
- Option C – New Code-Compliant Tank Farms

4.1 OPTION A – NO ACTION

Option A is not recommended. Without bulk fuel upgrade action in the Village of Beaver, hazards will persist and infrastructure will continue to deteriorate, exacerbating existing hazards and increasing the risk of additional hazards to develop over time.

4.2 OPTION B – REPAIR EXISTING FACILITIES AND EQUIPMENT AS NEEDED

Option B included the assessment of tank repair and painting, secondary containment installation/replacement, fuel pipeline and header repair/replacement, appurtenances repair/replacement, electrical repair/replacement, installation of a new retail gasoline tank and dispenser, installation of a new buried pipeline from TF2 to the generator house, provision of a new mobile tank trailer, and the included training and maintenance improvement recommendations. The intent of Option B is to implement repairs to existing facilities and equipment that would likely result in 10 or more years of remaining useable life and reduce risk to the environment and the life, health, and safety of residents and visitors of the community.

Based on historical fuel use records and the method and frequency of fuel delivery, a surplus of fuel storage capacity exists at the Village of Beaver. It is recommended that the existing total capacity of approximately 80,350 gallons at TF1 and TF2 be reduced to 39,200 gallons.

In developing the Option B cost estimate, costs were provided for each of the repair elements mentioned above resulting in a total cost of $680,670. However, tank repair and painting is not recommended as the tanks are in relatively good condition and do not appear to require repair or painting to achieve 10 or more years of remaining useable life. The installation of new secondary containment would provide a safeguard for continued use of the older tanks. In addition, buried fuel pipeline repair/replacement is not recommended, rather implementing annual pneumatic pressure testing is recommended to ensure that the pipeline is not leaking.

The repairs recommended for Option B, excluding repairs for the TF1 school tanks, include secondary containment installation/replacement, airstrip fill header repair/replacement, appurtenances repair/replacement, and electrical repair/replacement at an estimated cost of $454,305. If repairs resulted in a maximum useable lifetime of 15 years, the repair cost per year of useable lifetime would be approximately $30,000 per year.

4.3 OPTION C – NEW CODE COMPLIANT TANK FARMS

Installation of new code compliant TFs to replace existing infrastructure in the Village of Beaver would significantly reduce or eliminate risks to the environment and the life, health, and safety of residents and visitors of the community by eliminating many of the existing hazards present at

the facilities in their current condition. New code compliant TFs installed in the village would be designed to operate for the next 20 to 40 years before requiring major maintenance overhaul or replacement. Based on historical data provided by the AEA, and applying a construction cost inflation rate of 3 percent, the cost of new code compliant TFs resulting in 42,800 gallons of fuel storage capacity would range from approximately $1,112,800 to 1,455,200. If a design life for new TFs of 40 years is assumed, the construction cost for new TFs per year of design life, using the high value in the cost estimate range, would be approximately $36,380 per year.

4.4 OVERALL RECOMMENDATION

The overall recommended bulk fuel facility upgrade alternative is Option B. Implementing Option B would meet the AEA Bulk Fuel Upgrade Program objective of reducing or eliminating risks to the environment and the life, health, and safety of residents and visitors of the community in a cost-effective manner. In addition, Option B provides a better value assuming repair would result in a cost of approximately $30,000 per year for 15 years versus the construction cost of new TFs at $36,380 per year for 40 years.

5.0 CLOSURE

This report has been prepared for the exclusive use of the AEA and their representatives in the study of bulk fuel upgrade alternatives for the Village of Beaver. The information presented within this letter report is based on a relatively high-level study completed on a limited time frame by R&M. Since opinions of conditions prevailing at the TFs in the Village of Beaver must be based on the work authorized by the client, all information presented herein must be construed as representative of the Village at a particular moment in time and the result of services performed within the scope, limitations, and cost of the work requested. Changes in the conditions of the TFs in the Village of Beaver may occur with the passage of time and may be due to natural processes or the works of man. In addition, changes in government codes, either State or Federal regulations or laws, may occur. Due to such changes, which are beyond our control, observations and recommendations applicable to this site may need to be revised wholly or in part from time to time.

R&M Consultants, Inc. performed this work in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond exercise of reasonable care and professional diligence, is made. Should you require additional information regarding the investigation or this report, please contact us.

Sincerely,

R&M CONSULTANTS, INC.

Reviewed By:

William J. Rhodes
Environmental Engineer

Robert M. Pintner, P.E.
Senior Civil Engineer

6.0 REFERENCES

ADCCED (Alaska Department of Commerce, Community, and Economic Development), 2016. https://www.commerce.alaska.gov/web/dcra, accessed 3 August 2016.

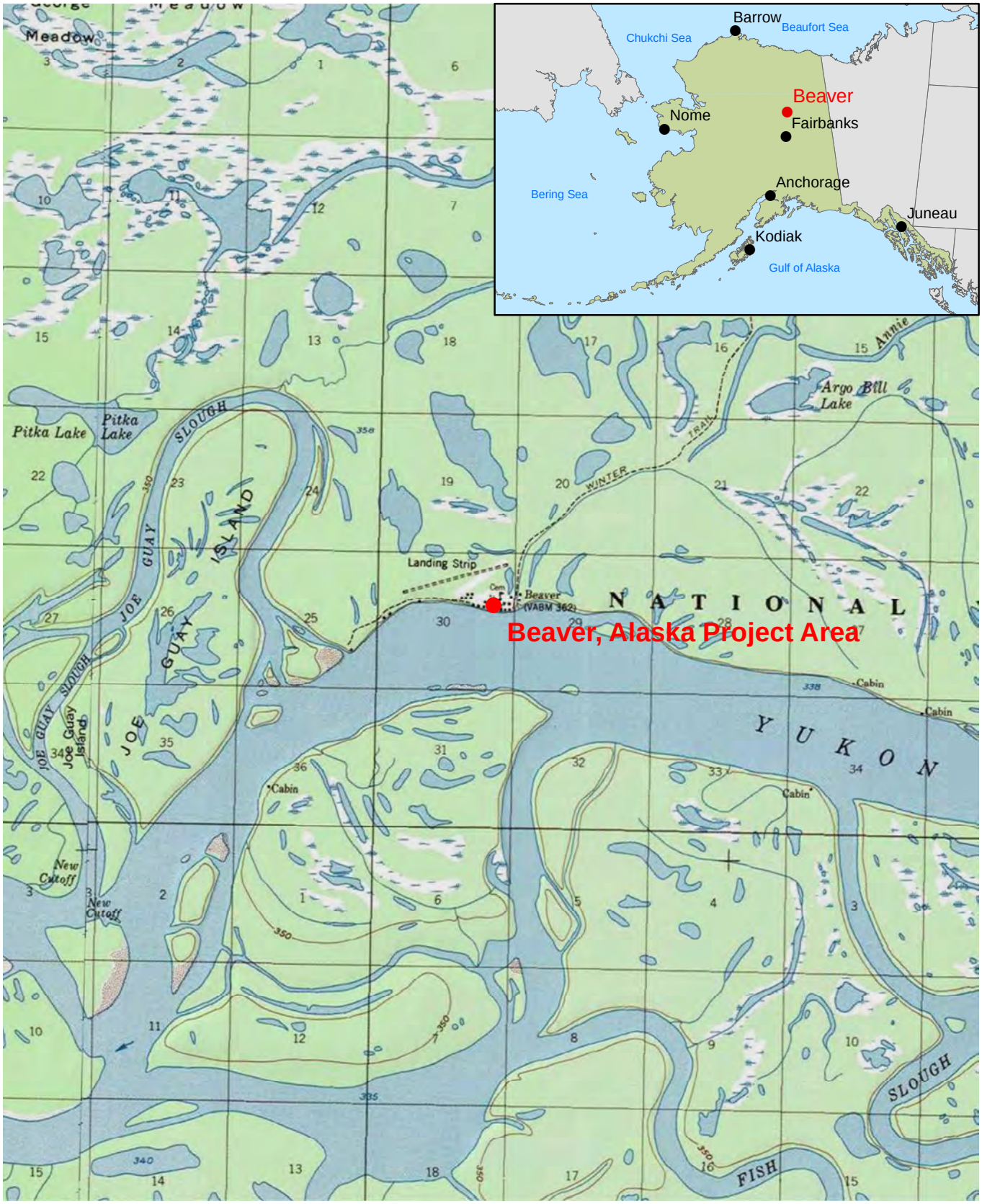
ADEC (Alaska Department of Environmental Conservation), 2016. http://dec.alaska.gov/spar/csp/db_search.htm , accessed 10 August 2016.

ERM (Environmental Resources Management) 2015. *Bulk Fuel Assessment Report – Beaver, Alaska.* May 2015.

USACE (U.S Army Corps of Engineers), 2011. *Flood Hazard Data - Beaver*, Alaska. October 2011.

APPENDIX A
SCHEMATIC DRAWINGS AND/OR COMMUNITY SITE PLAN

Beaver Village Vicinity Map.....A-01
Beaver Village Overview Map.....A-02
Site Plan – Tank Farm #1 and Tank Farm #2.....A-03



ALL LOCATIONS ARE APPROXIMATE

0 2,640 5,280 10,560 Feet

APPROXIMATE SCALE IN FEET

N

Date Saved: 8/25/2016 12:26:39 PM by ktherrien Z:_GIS\Projects\2415.01 AEA 2016 Bulk Fuel Upgrade Letter Report\Map Documents\Beaver_A-01_VicinityMap.mxd

DWN:	K.G.T
CKD:	C.H.R
DATE:	AUG. 2016
SCALE:	AS SHOWN

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2016 BULK FUEL UPGRADES
BEAVER, ALASKA

BEAVER VILLAGE
VICINITY MAP

FB:	N/A
GRID:	BEAVER B-1
PROJ.NO:	2415.01
DWG.:	A-01

This map was prepared by the Alaska Department of Commerce, Community, and Economic Development (Commerce) using funding from the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. Commerce contracted with Global Positioning Services Incorporated in May of 2010 to prepare the map. The original AutoCAD drawing or orthophoto has been revised or added to as described: No additions to drawing other than labeling. Displaying only aerial photography, labels, and select line work from the original drawing

Plotted 8/23/2016 12:17 PM by Kyle Therrien Z:\project2415.01 AEA 2016 Bulk Fuel Upgrades Letter Report\Earth\ACAD\Beaver ACAD\Beaver BFS.dwg

FB: N/A
GRID: BEAVER B-1
PROJ.NO: 2415.01
DWG.: A-02

2016 BULK FUEL UPGRADES
BEAVER, ALASKA

BEAVER VILLAGE
OVERVIEW MAP

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DWN: K.G.T.
CKD: C.H.R.
DATE: AUG. 2016
SCALE: 1" : 300 FEET

This map was prepared by the Alaska Department of Commerce, Community, and Economic Development (Commerce) using funding from the Initiative for Accelerated Infrastructure Development (IAID). The IAID is supported by grants from the Denali Commission, USDA Rural Development, Alaska Department of Transportation and Public Facilities and Commerce. Commerce contracted with Global Positioning Services Incorporated in May of 2010 to prepare the map. The original AutoCAD drawing or orthophoto has been revised or added to as described: No additions to drawing other than labeling. Displaying only aerial photography, labels, and select line work from the original drawing

APPROX. LOCATION OF AIRSTRIP FILL HEADER

TANK FARM #2 BEAVER VILLAGE

TANK FARM #1 AND TANK FARM #2 FILL LINE

FIFTH AVENUE

SCHOOL BOILER FEED LINE

Sewage Lagoon

C STREET

Playground

FOURTH AVENUE

Cemetery

TANK FARM #1 SCHOOL TANK FARM

MAINTENANCE SHOP HEATER FEED LINE

APPROX. LOCATION OF ABANDONED WASHETERIA PIPELINE

A STREET

SCHOOL MAINTENANCE SHOP

SECOND AVENUE

WASHETERIA

GENERATOR HOUSE

B STREET

GASOLINE SHACK

Plotted 8/23/2016 12:17 PM by Kyle Therrien

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FB: N/A
GRID: BEAVER B-1
PROJ.NO: 2415.01
DWG.: A-03

2016 BULK FUEL UPGRADES
BEAVER, ALASKA

SITE PLAN - TANK FARM #1 AND TANK FARM #2

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rmconsult.com • email@rmconsult.com

DWN: K.G.T.
CKD: C.H.R.
DATE: AUG. 2016
SCALE: 1" : 100 FEET

APPENDIX B
CORRESPONDENCE/PHONE NOTES/MEETING NOTES

R&M CONSULTANTS, INC.
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212 Front Street #150 • Fairbanks, AK 99701 • 907.452.5270

Communication Record

Project:	AEA BFU Letter Report – Beaver	**Project No.**	2415.01
Subject	Community Information	**Date:**	8-2-2016
Call To:	Beaver Village – Chief	**Telephone No.**	907.628.6126
Call From:	R&M	**Telephone No.**	907.458.4306
Discussion Between	Rhonda Pitka	**and**	Will Rhodes

W Rhodes provided Rhonda with the general project overview and verified local contact information.

Regarding local labor skills, Rhonda indicated that Beaver could provide general laborers, carpenters, and a mechanic. Rhonda stated that local construction equipment is generally dilapidated, but the Village manages to make equipment operational as needed when projects arise. The material source On the north side of the airstrip may be utilized. Various barge operators serve the village. The basic Fuel management systems have not changed since the 2015 assessment was conducted.

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Communication Record

Project:	AEA BFU Letter Report – Chalkyitsik & Beaver	**Project No.**	2415.01
Subject	School District Fuel Use	**Date:**	8-2-2016
Call To:	Yukon Flats School District – Maint. Director	**Telephone No.**	907.662.2515
Call From:	R&M	**Telephone No.**	907.458.4306
Discussion Between	Tony Peter **and**	Will Rhodes	

W Rhodes contacted the YFSD Maintenance Director, Tony Peter, to discuss fuel storage and use at the Beaver and Chalkyitsik schools. Tony indicated that both schools operate on roughly the same amount of fuel on an annual basis of approx. 18,000 to 20,000 gal per year. A maximum high estimate would be approx. 25,000 gal per year. Only three tanks are utilized at each school to hold a rough maximum of 15,000 gal at any given time. The school district prefers to purchase a large volume when prices are down, if possible. In July 2016 the YFSD purchased roughly 15,000 gal of fuel, which is projected to last from September 2016 to January 2017. Beaver had difficulty achieving the required minimum number of students to receive funding in 2016 and the future of the school is tenuous. The YFSD will wait to purchase fuel for the Beaver school until adequate enrollment is confirmed following the first week of school which begins on August 30, 2016. If schools close due to inadequate enrollment, the YFSD will winterize plumbing with glycol discontinue heating/fuel use. This model for school closure was implemented fairly recently in Stevens Village and is the method YFSD intends to use going forward. Note YFSD has recently purchased fuel from both Everts and AK Air Fuel, depends on price.

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Communication Record

Project:	AEA BFU Letter Report – Beaver, Alaska	**Project No.**	2415.01
Subject	Heavy Equipment	**Date:**	8/15/2016
Call To:	Beaver DOT Maintenance Contractor	**Telephone No.**	907.628.6622
Call From:	R&M	**Telephone No.**	907.458.4306
Discussion Between	Clifford Adams	**and**	W Rhodes

W Rhodes contacted Clifford Adams, the Beaver Airstrip Maintenance contract holder. W Rhodes inquired about the equipment available at the DOT Airstrip Maintenance Station. Clifford indicated that the DOT maintains a loader and grader at the station, however the equipment is for use on DOT airport property only.

APPENDIX C
PHOTOGRAPH LOG

Photograph 1: Airstrip fill header

Photograph 2: Airstrip fill header

Photograph 2: Tank Farm #1; Cruikshank School and Village of Beaver tanks

Photograph 3: Tank Farm #1; Cruikshank School and Village of Beaver tanks

Photograph 4: Tank Farm #1 manifold piping

Photograph 5: Tank Farm #1 manifold piping

Photograph 6: Leaking feed pipe from Tank Farm #1 to the maintenance shop; no containment

Photograph 8: Beaver Village tanks not-in-service at Tank Farm #1

Photograph 9: Tank Farm #2 Beaver Village tanks

Photograph 10: Tank Farm #2 Beaver Village tanks; only tank #1 in foreground is in service

Photograph 11: Tank Farm #2 manifold piping

Photograph 12: 500 gal intermediate tank used to transfer fuel into the fuel trailer tank

Photograph 13: 500 gal fuel trailer tank; generator house supply tank in background

Photograph 14: generator house supply tank

Photograph 15: 300 gal "Gasoline Shack" tanks on wooden skids

Photograph 16: "Gasoline Shack"; locked with 55-gal drums inside used for retail sale

APPENDIX D

2015 BULK FUEL ASSESSMENT REPORT

BEAVER, ALASKA

BULK FUEL ASSESSMENT REPORT

Beaver, Alaska

May 2015

Prepared for:

Alaska Energy Authority

Prepared by:

ERM Alaska, Inc.
825 West 8th Avenue
Anchorage, Alaska 99501

Date: May 18, 2015

Assessor: Will Rhodes (ERM)

Community Name: Beaver, Alaska

Population: 87

Local Government(s): Village of Beaver

Contact Info: Ronda Pitka, Chief, 907-628-6126

Fuel Suppliers: Everts Air Cargo

Bulk Fuel Storage Facility Info:

When the previous assessment was performed in 1997, the four bulk fuel facilities in the list below were identified and evaluated. Of those facilities only the two facilities shown in bold text are eligible for assistance and are included in this report.

TF1. Yukon Flats School District/Village of Beaver – Cruikshank School
TF2. Village of Beaver – Power Plant
TF3. Beaver Tribal Council, Inuit Store Gasoline Tanks (Removed)
TF4. Abandoned Inuit Store Gasoline Tank (Abandoned)

The Village of Beaver maintains the primary power plant, producing electricity using one serviceable diesel powered generator. Currently two of the three generators at the power plant are not in service. A heat recovery system is used to supply waste heat to the washeteria. The Cruikshank School (Beaver School) maintains two emergency backup generators and uses heating fuel to operate boilers for space heating. The Beaver School and Village of Beaver both own tanks at TF1, however the Village of Beaver tanks have not been in service for a number of years.

Fuel is delivered to Beaver by Everts Air Cargo. Diesel fuel is transferred from the airstrip header to Tank Farms 1 and 2 through a 3-inch welded steel aboveground pipeline with flanged joints. The airport header is connected to a 3-inch flexible hose equipped with a gate valve and cam-lock fittings. A trailered 500-gallon tank is used to transfer diesel fuel from TF2 to a 1,000-gallon intermediate tank at the power plant and to the “gas shack” where heating fuel is transferred to 55-gallon drums for retail sale. The Village also uses the trailered tank to haul gasoline from the airstrip to the “gas shack” where it is transferred to 55-gallon polyethylene drums for retail sale. Gasoline is typically sold in 5-gallon increments.

The Village of Beaver is in the process of obtaining two new generators to replace the non-serviceable generators at the power plant.

Tank Farm #1 – School Tank Farm

Owner/Phone #: Yukon Flats School District / 907-662-2515

Owner Type: School

Location: South of Cruikshank School, adjacent to old Bureau of Indian Affairs School

Total Evaluation Score (See Scoring Sheet): 125 (240 max)

Regulatory Plans Available: ☒ No ☐ Yes

Spill Response Equipment: ☐ No ☒ Yes; Sorbent pads and boom in the maintenance shop

Operator/Training/ Years on the Job: Jay Schrock/None/6 years

Distance from Moorage to Barge Header: No Barge Header

Facility Description:

There are nine diesel fuel storage tanks at the Beaver School tank farm. Tanks 1-6 are owned by the Yukon Flats School District, and Tanks 7-9 are owned by the Village of Beaver but are not in service.

The tanks are single wall, vertical, and constructed of welded steel. The tanks have normal vents and top-mounted manholes, but no emergency venting. Each tank has a 2-inch threaded bottom fill/draw port and 1-inch water draw port. The tanks rest on a 2"x12" and 4"x"12 framed platform with no secondary containment. The tanks are inadequately spaced from one another. The tank farm is partially enclosed by a chain link fence with a locked gate; however the fence does not fully encompass the tank farm. Woody debris and relatively dense vegetation is growing in the fenced area.

The tank manifold consists of 2-inch threaded steel pipe with bronze gate valves. No check valves, pressure relief valves, or flex connections are present. Distribution piping leads away from the tank farm to day tanks in the school boiler building and the maintenance shop. Distribution piping from TF1 to the school boiler building and maintenance shop consists of 2-inch threaded aboveground piping. Manifold piping has leaked in the past evidenced by staining on the framed platform and adjacent ground surface. An active leak was present emanating from threaded joints in distribution piping exiting the tank farm directed toward the maintenance building.

Tank Farm 1 - Beaver Alaska										
Tank No.	Dia.	Height/ Length	Vertical/ Horizontal	Tank Type	Product	Tank Penetration Below Fuel Level	Tank Function	Approx Age (Years)	Listing	Gross Capacity (Gallons)
1	8.5'	14'	V	SW	D1	Y	BF	40+	UNK	6,000
2	9'	13.5'	V	SW	D1	Y	BF	40+	UNK	6,400
3	8'	13.5'	V	SW	D1	Y	BF	40+	UNK	5,000
4	9'	13.5'	V	SW	D1	Y	BF	40+	UNK	6,400
5	8.5'	13.5'	V	SW	D1	Y	BF	40+	UNK	5,700
6	8'	14'	V	SW	D1	Y	BF	40+	UNK	5,300
7	7.5'	14'	V	SW	-	Y	NIS	40+	UNK	4,600
8	7.5'	14'	V	SW	-	Y	NIS	40+	UNK	4,600
9	8'	14'	V	SW	-	Y	NIS	40+	UNK	5,300
									Total Gallons	**49,300**

TANK TYPE: SW = Single Wall, **DW** = Double Wall, **SD** = Self Diked, **PR** = Protected. **PRODUCT: D1** = Diesel #1/Heating Fuel, **D2** = Diesel #2, **ULSD** = Ultra Low Sulfur Diesel, **G** = Gasoline, **AV** = Avgas. **TANK FUNCTION: FD** = Fleet Dispensing, **RD** = Retail Dispensing, **BF** = Bulk Fuel. **LISTING**: **UL** = Underwriters Laboratories, **STI** = Steel Tank Institute, **API** = American Petroleum Institute, **UNK** = Unknown.

Tank Farm 1 - Deficiencies & Recommendations:

Site Location

☒ Tank farm in flood plain
☐ Facility threatened by coastal erosion/avalanche/river erosion/other
☐ Tank Farm within 100-feet of a well

Secondary Containment

☒ No containment
☐ Inadequate containment

Foundations

☐ Belly of tank more than 12” above grade
☒ Insufficient foundation (Logs or < 6-inch timbers)
☐ No foundation (tank shell directly on ground)
☐ Failing foundation (leaning tank)

Tanks

☒Tanks not numbered and labeled
☒ Missing or improper emergency venting
☐ Missing or improper normal venting
☐ Excessive tank corrosion
☒ Tanks not listed or designed to current bulk fuel standards (riveted, water tanks, etc.)
☒ No overfill protection

Piping

☒ No check valve at fill point
☒ Missing or inadequate drip pan at fill point
☒ Missing pressure relief
☒ Improper valve material (brass, bronze)
☒ Active leaks
☒ Evidence of past leaks
☐ Damaged or stressed flex connector(s)
☒ Inadequate pipe supports

Electrical

☐ Exposed or improper wiring
☐ Electrical conduit not supported at code-required intervals (10’ or less)
☐ No evidence of grounding

Life, Health & Safety

☐ No fence
☐ Insufficient Egress
☒ Missing or insufficient regulatory signs
☒ Missing or insufficient fire extinguishers
☒ Missing Regulatory Plans
☐ Dispenser too close to tanks
☐ Inadequate separation from buildings
☒ Inadequate tank spacing
☐ No locks on gates
☒ No locks on closed tank issue valves
☒ Gravity dispensing
☐ Spill response equipment not available

☐ Other (specify):_____

_____

Recommend resolving above issues. Facility is in relatively poor condition.

Tank Farm 1 - Evaluation Score:

Facility Category	Possible Points	Awarded Points
Site Location		
Site suitable for tank farm	0 points	
< 100 feet from a public well	10 points	
< 25 feet from an eroding bank or beach, or history of flooding	10 points	10
Gasoline tanks < 25 feet from an important building	10 points	
	30 points max.	**10**
Secondary Containment		
*Liquid-tight, lined dike of proper volume and construction, or double wall or self diked tanks	0 points	
*Liquid-tight, lined dike of improper volume or construction	10 points	
*Fully diked but not liquid-tight (sand bag dike, gravel, torn or missing liner)	20 points	
*Partial or no dike	30 points	30
	30 points max	**30**
Foundations		
*Tanks on stable foundations (steel skids, min. 6" timbers, no cribbing)	0 points	
*Tanks directly on gravel pad or light timbers	5 points	5
*Tanks directly on tundra or natural soils (no dike or liner, subject to erosion)	10 points	
Tanks leaning considerably or unstable foundations (seismic hazard)	10 points	
	20 points max.	**5**
Tanks		
*Tanks in fair to good condition (no dents, min. rust, no major repairs needed)	0 points	
*Immediate need of cleaning and painting	10 points	10
*Rusted or dented beyond repair or riveted, bolted or other	30 points	
	30 points max.	**10**
Piping (choose most likely to leak, i.e., victaulic, threaded or welded, only)		
*No piping or welded piping above grade	0 points	
*Welded piping below grade	5 points	
*Threaded piping above grade	10 points	10
*Threaded piping below grade	20 points	
*Victaulic piping above grade	30 points	
*Victaulic piping below grade	40 points	
Rubber hose	20 points	
Additional for active leaks	20 points	20
	80 points max.	**30**
Electrical		
Wiring appears appropriate or there is no wiring.	0 points	0
Exposed wiring, improper grounding, etc.	10 points	
	10 points max.	**0**
Life, Health & Safety		
*Appears code compliant (No extraordinary factors observed)	0 points	
***Low risk** (Minor code violations that could result in personal injury to non-vigilant employees, such as tripping hazards, limited lighting, etc.)	10 points	
***Medium risk** (More severe code violations that increase risk such as lack of security fence, falling hazards, unlocked valves, gravity dispensing, etc.)	20 points	
***High risk** (Situations that pose an immediate threat to safety such as Fire hazards, gas leaks, failing tanks, unstable foundations, etc.)	40 points	40
	40 points max.	**40**
Facility Total	**240 points max.**	**125**

*Indicates that only one of the group should be chosen.

Tank Farm 1 - Photos:

Photo 1 – School Tank Farm

Photo 2 – School Tanks Manifold Piping

Tank Farm #2 – Power Plant

Owner/Phone #: Village of Beaver / 907-628-6126

Owner Type: Tribal Council

Location: West of School across C Street

Total Evaluation Score (See Scoring Sheet): 90 (240 Max)

Regulatory Plans Available: ☒ No ☐ Yes

Spill Response Equipment: ☒ No ☐ Yes; Limited supplies near facility

Operator/Training/ Years on the Job: Derrick Murray/Certified for Bulk Fuel/1 yr

Distance from Moorage to Barge Header: No Barge Header

Facility Description:

There are three stationary diesel fuel storage tanks and one trailered tank (mobile) at the Village of Beaver power plant tank farm. Currently Tanks 2 and 3 are not in service. Tanks 1-3 are single wall and skid-mounted, situated within a lined gravel dike. The diked area was full of vegetation and the tank skids were largely submerged in water. It appeared that the diked area has been inundated with water for years in spite of the liner being visibly torn in places. The tank farm is enclosed by a chain link security fence with an unlocked gate and no security lighting.

Facility piping consists of 3-inch threaded steel pipe with bronze gate valves. Piping has been disconnected from Tanks 2 and 3. The 3-inch pipe reduces to 2-inch pipe and a steel ball valve with a cam-lock fitting that connects to 1.5-inch flexible hose. The Flexible hose is routed outside of the tank farm security fence to the staging area for the 500-gallon trailered tank. Fuel is transferred from Tank 1 to the 500-gallon trailered tank with a gas-powered transfer pump. Tank one is bottom fill/draw with no overfill protection.

Tank Farm 2 – Beaver Alaska										
Tank No.	Dia.	Height/ Length	Vertical/ Horizontal	Tank Type	Product	Tank Penetration Below Fuel Level	Tank Function	Approx Age (Years)	Listing	Gross Capacity (Gallons)
1	8'	27.5'	H	SW	D1	Y	BF	40+	UNK	10,350
2	8'	27.5'	H	SW	-	Y	NIS	40+	UNK	10,350
3	8'	27.5'	H	SW	-	Y	NIS	40+	UNK	10,350
									Total Gallons	**31,050**

TANK TYPE: SW = Single Wall, **DW** = Double Wall, **SD** = Self Diked, **PR** = Protected. **PRODUCT: D1** = Diesel #1/Heating Fuel, **D2** = Diesel #2, **ULSD** = Ultra Low Sulfur Diesel, **G** = Gasoline, **AV** = Avgas. **TANK FUNCTION: FD** = Fleet Dispensing, **RD** = Retail Dispensing, **BF** = Bulk Fuel, **NIS = Not in service**. **LISTING**: **UL** = Underwriters Laboratories, **STI** = Steel Tank Institute, **API** = American Petroleum Institute, **UNK** = Unknown.

Tank Farm 2 - Deficiencies & Recommendations:

Site Location

☒ Tank farm in flood plain
☐ Facility threatened by coastal erosion/avalanche/river erosion/other
☐ Tank Farm within 100-feet of a well

Secondary Containment

☐ No containment
☒ Inadequate containment

Foundations

☐ Belly of tank more than 12” above grade
☐ Insufficient foundation (Logs or < 6-inch timbers)
☐ No foundation (tank shell directly on ground)
☐ Failing foundation (leaning tank)

Tanks

☒Tanks not numbered and labeled
☒ Missing or improper emergency venting
☐ Missing or improper normal venting
☐ Excessive tank corrosion
☒ Tanks not listed or designed to current bulk fuel standards (riveted, water tanks, etc.)
☒ No overfill protection

Piping

☐ No check valve at fill point
☒ Missing or inadequate drip pan at fill point
☒ Missing pressure relief
☒ Improper valve material (brass, bronze)
☐ Active leaks
☐ Evidence of past leaks
☐ Damaged or stressed flex connector(s)
☒ Inadequate pipe supports

Electrical

☐ Exposed or improper wiring
☐ Electrical conduit not supported at code-required intervals (10’ or less)
☐ No evidence of grounding

Life, Health & Safety

☐ No fence
☒ Insufficient Egress
☒ Missing or insufficient regulatory signs
☒ Missing or insufficient fire extinguishers
☒ Missing Regulatory Plans
☐ Dispenser too close to tanks
☐ Inadequate separation from buildings
☐ Inadequate tank spacing
☒ No locks on gates
☒ No locks on closed tank issue valves
☐ Gravity dispensing
☒ Spill response equipment not available

☐ Other (specify):_____

_____

Recommend resolving above issues, facility is in poor condition.

Tank Farm 2 - Evaluation Score:

Facility Category	Possible Points	Awarded Points
Site Location		
Site suitable for tank farm	0 points	
< 100 feet from a public well	10 points	
< 25 feet from an eroding bank or beach, or history of flooding	10 points	10
Gasoline tanks < 25 feet from an important building	10 points	
	30 points max.	**10**
Secondary Containment		
*Liquid-tight, lined dike of proper volume and construction, or double wall or self diked tanks	0 points	
*Liquid-tight, lined dike of improper volume or construction	10 points	
*Fully diked but not liquid-tight (sand bag dike, gravel, torn or missing liner)	20 points	20
*Partial or no dike	30 points	
	30 points max	**20**
Foundations		
*Tanks on stable foundations (steel skids, min. 6" timbers, no cribbing)	0 points	0
*Tanks directly on gravel pad or light timbers	5 points	
*Tanks directly on tundra or natural soils (no dike or liner, subject to erosion)	10 points	
Tanks leaning considerably or unstable foundations (seismic hazard)	10 points	
	20 points max.	**0**
Tanks		
*Tanks in fair to good condition (no dents, min. rust, no major repairs needed)	0 points	
*Immediate need of cleaning and painting	10 points	10
*Rusted or dented beyond repair or riveted, bolted or other	30 points	
	30 points max.	**10**
Piping (choose most likely to leak, i.e., victaulic, threaded or welded, only)		
*No piping or welded piping above grade	0 points	
*Welded piping below grade	5 points	
*Threaded piping above grade	10 points	10
*Threaded piping below grade	20 points	
*Victaulic piping above grade	30 points	
*Victaulic piping below grade	40 points	
Rubber hose	20 points	20
Additional for active leaks	20 points	
	80 points max.	**30**
Electrical		
Wiring appears appropriate or there is no wiring.	0 points	0
Exposed wiring, improper grounding, etc.	10 points	
	10 points max.	**0**
Life, Health & Safety		
*Appears code compliant (No extraordinary factors observed)	0 points	
***Low risk** (Minor code violations that could result in personal injury to non-vigilant employees, such as tripping hazards, limited lighting, etc.)	10 points	
***Medium risk** (More severe code violations that increase risk such as lack of security fence, falling hazards, unlocked valves, gravity dispensing, etc.)	20 points	20
***High risk** (Situations that pose an immediate threat to safety such as Fire hazards, gas leaks, failing tanks, unstable foundations, etc.)	40 points	
	40 points max.	**20**
Facility Total	**240 points max.**	**90**

*Indicates that only one of the group should be chosen.

Tank Farm 2 - Photos:

Photo 1 – Tank Farm 2

Photo 2 – Tank Farm 2 Piping and Inundated containment