2016 Bulk Fuel Upgrades Letter Report
Chalkyitsik, Alaska

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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
CNC ..... Chalkyitsik Native Corporation
CP ..... cathodic protection
CVC ..... Chalkyitsik Village Council
DFT ..... dry film thickness
DRO ..... diesel-range organics
EAC ..... Everts Air Cargo
GRO ..... gasoline-range organics
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
CHALKYITSIK, 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 Chalkyitsik, 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 Chalkyitsik bulk fuel situation and needs were determined by completing the scope of work and upgrade recommendations were developed; both are discussed below.

SITUATION AND NEEDS

Three of five existing bulk fuel storage facilities in the Village of Chalkyitsik are eligible for assistance in the AEA's Bulk Fuel Upgrades Program. The existing bulk fuel storage facilities and equipment at TFs 1, 2, and 4 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 Chalkyitsik 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 Chalkyitsik, existing bulk fuel facilities could be repaired or new code-compliant bulk fuel facilities could be constructed.

UPGRADE RECOMMENDATIONS

Three alternatives were assessed to address the Village of Chalkyitsik 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 Chalkyitsik, 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 EXITING FACILITY 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, and 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 Chalkyitsik. It is recommended that the existing total capacity of approximately 83,800 gallons at TFs 1, 2, and 4 be reduced to 48,600 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 $525,365. 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 $328,890. If repairs resulted in a maximum useable lifetime of 15 years, the repair cost per year of useable lifetime would be approximately $21,900 per year.

OPTION C – NEW CODE COMPLIANT TANK FARMS

Installation of new code compliant TFs to replace existing infrastructure in the Village of Chalkyitsik 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 48,000 gallons of fuel storage capacity would range from approximately $1,248,000 to 1,632,000. 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 $40,800 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 $21,900 per year for 15 years versus the construction cost of new TFs at $40,800 per year for 40 years.

2016 BULK FUEL UPGRADES LETTER REPORT
CHALKYITSIK, ALASKA

1.0 COMMUNITY OVERVIEW

1.1 LOCATION AND ACCESS

The Village of Chalkyitsik is located on the Black River approximately 42 miles east of Fort Yukon, Alaska and approximately 170 miles northeast of Fairbanks, Alaska. The Village of Chalkyitsik is accessed by riverboat, airplane, and in recent years barge service (Yukon Cargo) if the Black River water levels are of sufficient stage. There is no existing road system that connects the village to any other communities. A Chalkyitsik Village vicinity map is presented in Appendix A as Drawing A-01.

Tank Farm TF1 is located adjacent to the Chalkyitsik Village Council (CVC) generator house and Yukon Flats School District (YFSD) Tsuk Taih School in Chalkyitsik, Alaska. The site is accessed by Salmon Avenue and Fishhook Drive. The site is located in Township 21 North, Range 18 East, and Section 13 of the Fairbanks Meridian; at 66.6501 degrees north and -143.7290 degrees west in WGS1984 decimal degree coordinates based on locating the site in Google Earth Pro™. The site vicinity is shown on Drawing A-02 and the TF1 site plan is depicted on Drawing A-03.

TF2 is located at the Chalkyitsik Store, owned by the Chalkyitsik Native Corporation (CNC), in Chalkyitsik, Alaska. The site is accessed by Belle Street and Porcupine Avenue. The site is located in Township 21 North, Range 19 East, and Section 7 of the Fairbanks Meridian; at 66.6536 degrees north and -143.7216 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 the TF2 site plan is depicted on Drawing A-04.

TF4, owned by the CNC, is located at the Airstrip in Chalkyitsik, Alaska. The site is located adjacent to the airstrip runway to the north. The site is located in Township 21 North, Range 18 East, and Section 13 of the Fairbanks Meridian; at 66.6488 degrees north and -143.7301 degrees west in WGS1984 decimal degree coordinates based on locating the site in Google Earth Pro™. The site vicinity is shown on Drawing A-02 and the TF1 site plan is depicted on Drawing A-05.

1.2 HISTORY AND CULTURE

Chalkyitsik is described to be a traditional Gwich'in Athabascan village as its residents live a subsistence lifestyle. The village was traditionally used by nomadic Gwich'in Natives as a seasonal fishing site during the summer months. The first permanent structure was constructed in the 1930s by a Canadian native and his Black River Gwich'in wife. Late 1930s a boat hauling materials for the purpose of constructing a school at Salmon Village was stranded due to low water at Chalkyitsik. It was decided to build the school in Chalkyitsik instead and materials were unloaded and the school was constructed. The Black River People settled around the school and built a permanent community in Chalkyitsik (ADCCED, 2016).

1.3 ENVIRONMENTAL CONDITIONS

1.3.1 FLOOD HAZARDS

Yearly flooding has been recorded during the 1920s to the 1940s. The worst years were 1937, 1947 or 1948, and 1967. The highest flood event in history was in 1937 which was caused by snow melt. Elevation of this flood was not determined but had been recorded to rise to above any existing buildings. The 1937 flood event was estimated to be as much as 3 feet higher than the 1967 flood. The 1937 flood event has been determined to be the best representation for the 100-year flood or Base Flood Elevation. The 1967 flood is the highest officially recorded flooding event in Chalkyitsik which raised the Black River to 106.6 feet above mean sea level (AMSL). The most recent flood event in Chalkyitsik was in June 18, 1997. No flood elevation exists for the 1997 flood event as the water level gauge for Chalkyitsik had recently been removed.

The recommended building elevation for Chalkyitsik is 109.6 AMSL feet based off of the Base Flood Elevation. The majority of the buildings in the village are constructed at 5.6 to 9.6 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

Chalkyitsik is located on a relatively sharp outer bend of the Black River. The village is situated on the western 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 12 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. While melting permafrost, vehicle traffic, and human activity have also been deemed by a local survey to be additional contributing factors. In 1987 a total of 3 feet of river bank eroded and caused a two story building to be relocated by residents. In 1997 a section of bank that was 300 feet long and 10 feet wide eroded.

A river oxbow called the Chalkyitsik Slough is located to the south east of village. The river oxbow can be seasonally dry or inundated by flowing water from the Black River. A major flood or erosional event potentially poses a low erosional hazard threat to the community due to the numerous buildings, roads, and infrastructure located within close proximity to the Black River (USACE, 2007).

1.3.3 POTENTIAL CLIMATE CHANGE IMPACTS OVER 10 YEARS

In 2000 Black River bank erosion adjacent to Chalkyitsik was determined to be progressing at a rate of 1-foot per year. Accelerated permafrost thawing, active layer thickening, and ground subsidence could yield a potentially accelerated erosion rate over the next decade. Extreme weather events could also impose unique impacts on the village of Chalkyitsik. 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.

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
Woodie Salmon	CVC / First Chief	907.848.8411	TF1
Tamara Henry	CVC / Tribal Administrator	907.848.8117	TF1
James Nathaniel	CVC / Roads Director	907.848.8117	NA
Pamela Joseph	CNC / Manager	907.848.8112	TF2, TF4
Chris James	CVC / Tank Farm Operator	907.848.8117	TF1
Tony Peter	YFSD / Maintenance Director	907.662.2515	TF1

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 July 28 and 29, 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 Chalkyitsik were discussed with the CVC Tribal Administrator – Tamara Henry, and CVC Roads Director – James Nathaniel. Tamara indicated that local labor skills include carpenters, heavy equipment operators, a welder and mechanic, and general laborers. Mr. Nathaniel provided CVC labor rates listed below.

- Heavy Equipment Mechanic: $45.00 per hour
- Heavy Equipment Operator: $28.65 per hour
- General Laborer: $24.00 per hour

1.7 LOCAL CONSTRUCTION EQUIPMENT

Available local construction equipment was discussed with the CVC Roads Director – James Nathaniel. James provided an equipment list outlined below.

- Excavator: Hitachi EX120-5
- Grader: John Deere 770 B-H
- Backhoe: Case 580C
- Bulldozer: John Deere JD 350C
- Bulldozer: Caterpillar DC6
- Front-End Loader: Caterpillar 966C
- Dump Truck: International
- Dump Truck
- (2) Heavy Truck: GMC Brigadier
- Flatbed Truck: Ford Diesel
- Van: Chevrolet
- Compactor

2.0 EXISTING TANK FARMS

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

- TF1: CVC/YFSD – Power Plant/School
- TF2: CNC – Chalkyitsik Store Retail Sales
- TF4: CNC – Airstrip Tanks

These TFs are described in detail in the *2015 Bulk Fuel Assessment Report – Chalkyitsik, Alaska* (ERM 2015), provided in Appendix D. Site plans for TFs 1, 2, and 4 are presented in Appendix A as drawings A-03, A-04, and A-05, respectively. 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 July 28-29, 2016 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. Current relevant contact information is detailed in Table 1-1 and Table 2-1.

2.2 RETAIL FUEL SALES

Retail fuel sales are provided by the CNC. The CNC owns and operates TF2, located at the Chalkyitsik Store, where retail gasoline is available at a metered dispenser. The CNC also owns and operates TF4, located at the Airstrip, where retail heating oil is stored. Retail heating oil is transferred to a tanker truck, owned by the CNC, and is subsequently delivered to end users.

2.3 PIPELINES AND HEADER SYSTEMS

Pipelines and a single product header system support fuel transfer to and from TF1. The single product header system, located near the airstrip, consists of flanged steel gate and check valves, and a 3-inch cam-lock fuel hose connection point. An open-top 90-gallon catch basin is situated underneath the fuel hose connection point.

The header system is connected to a 3-inch welded steel pipeline that runs approximately 350-feet, mostly below grade, to the TF1 manifold. A 2-inch welded steel pipeline runs approximately 200-feet, mostly below grade, from the school tank manifold to the school's boiler building. A 2.5-inch welded steel pipeline runs from the village tank manifold approximately 175-feet to the CVC generator house.

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 – Power Plant	CVC	Tamara Henry	PO Box 57 Chalkyitsik, Alaska 99788	907.848.8117
TF2 – Chalkyitsik Store	CNC	Pamela Joseph	PO Box 53 Chalkyitsik, Alaska 99788	907.848.8112
TF4 – Airstrip Tanks	CNC	Pamela Joseph	PO Box 53 Chalkyitsik, Alaska 99788	907.848.8112

NOTE:
TF1 is shared by the CVC and the YFSD

2.5 ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION CONTAMINATED SITES SUMMARY

Each of the three 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 SITES

The ADEC Site Name for the collection of contaminated sites in the vicinity of TF1 is "Chalkyitsik School Bulk Fuel Storage," and the Hazard ID Number is 4648. Chalkyitsik School Bulk Fuel storage is located on the corner of Marten Street and Salmon Avenue in Chalkyitsik, Alaska. TF1 is located approximately 420 feet from the adjacent Chalkyitsik slough. Area wide soil contamination at this location has occurred from six separate known petroleum hydrocarbon sources; initial site characterization activities commenced in 2002. The sources include the following subsites: Former Fuel Bladder Storage Area and the School Water Treatment Building Day Tank; The Village Council and School District Tank Farm; the Generator Building; the Northern Teachers Housing; The Pipeline Leak at the Water Treatment Building and the 2009 diesel pipeline release.

A series of site characterization and remedial activities have occurred at this location since 2002. Site contaminants of concern include diesel range organics (DRO), gasoline range organics (GRO), and fuel-related volatile organic compounds (VOC). ADEC management of the site was transferred from the Anchorage Spill Prevention and Response (SPAR) Department to the Fairbanks SPAR Department. As of April 2016, the site has been assigned to a Fairbanks SPAR Department project manager for identification of the potentially responsible party, evaluation of cleanup progress, and follow-up.

2.5.2 TF2 CHALKYITSIK STORE CONTAMINATED SITE

The ADEC Site Name for soil contamination at TF2 is "Chalkyitsik Native Corporation Store Gasoline AST" and the Hazard ID Number is 4652. The site is located on the corner of by Belle Street and Porcupine Avenue in Chalkyitsik, Alaska. TF2 is located approximately 430 feet from the

adjacent Black River. Fuel handling practices have resulted in releases of gasoline from the tank and associated dispenser at TF2, as well as the tanker truck used to transfer and dispense fuel. The CNC has been identified as the responsible party.

Initial site characterization activities commenced in 2003, and recently additional characterization activities were completed in 2015. Site contaminants of concern include GRO and VOC. The ADEC sent a cleanup work plan request letter for additional delineation and remediation to the CNC in May 2016.

2.5.3 TF4 AIRSTRIP TANKS CONTAMINATED SITE

The ADEC Site Name for soil contamination at TF4 is "ADOT&PF Chalkyitsik Airport SREB & Apron ASTs" and the Hazard ID Number is 25308. Two separate areas of soil contamination exist at this site; the "Apron ASTs" refers to contamination associated with the tanks at TF4 and the "ADOT&PF Chalkyitsik Airport SREB" refers to contamination associated with the Alaska Department of Transportation & Public Facilities (ADOT&PF) snow removal equipment building.

TF4 is located on the airstrip apron approximately 350 feet from Big Marten Lake and approximately 500 feet from the Chalkyitsik Slough. During a site inspection in 2002, stained soil was observed near a gasoline tank and two diesel tanks at TF4. Initial site characterization activities were performed in 2003. Site contaminants of concern include GRO, DRO, and VOC. The CVC has been identified as the responsible party.

2.6 FUEL TRANSFER CAPABILITIES AND METHODS

The CVC and YFSD transfer fuel from the airstrip header to TF1 through a buried pipeline. The CVC and YFSD then transfer fuel through buried pipelines from TF1 to the generator house and the school's boiler building, respectively. The header system and pipelines are discussed in more detail in Section 2.3.

The CNC receives heating oil and gasoline at the airstrip. The heating oil is stored in tanks at TF4. The CNC transfers heating oil from TF4 to their 2,000 gallon fuel tanker truck for delivery to end users. The CNC receives gasoline at the airstrip directly into their fuel tanker truck and delivers it to TF2, where it is subsequently transferred to their gasoline storage tank. Gasoline is sold to end users through a dispensing pump at TF2.

2.7 HISTORICAL FUEL USE AND 10-YEAR FORECAST

Historically, diesel #1/heating fuel and gasoline have been used in the Village of Chalkyitsik. Diesel #1/heating fuel has been, and is currently, used for power generation using diesel generators, space and water heating using boilers, 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 CVC (TF1), CNC (TF2 and TF4), and the YFSD (TF1) 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 Chalkyitsik was approximately 48,800 gallons and 8,100 gallons, respectively. Table 2-2 below shows the monthly delivery volumes by fuel type and yearly totals for each organization.

TABLE2-2: CHALKYITSIK FUEL DELIVERIES – JANUARY 2013 THROUGH JULY 2016

CVC (TF1)		CNC (TF2 and TF4)			YFSD (TF1)	
Month / Year	Diesel #1 (gallons)	Month / Year	Diesel #1 (gallons)	Gasoline (gallons)	Month / Year	Diesel #1 (gallons)
2/13	4,650	1/13	2,000	1,800	2/13	4,650
4/13	4,470	6/13	4,345	--	8/13	18,300
8/13	1,500	8/13	1,500	3,600	--	--
9/13	4,650	12/13	--	2,000	--	--
12/13	3,870	--	--	--	--	--
2013 Total	**19,140**	**2013 Total**	**7,845**	**7,400**	**2013 Total**	**22,950**
1/14	5,000	2/14	1,000	2,000	10/14	4,040
2/14	5,000	4/14	--	2,000	--	--
4/14	4,470	7/14	4,000	--	--	--
5/14	5,000	8/14	--	2,000	--	--
9/14	4,470	9/14	2,000	1,000	--	--
10/14	4,000	11/14	--	2,000	--	--
12/14	4,000	--	--	--	--	--
2014 Total	**31,940**	**2014 Total**	**7,000**	**9,000**	**2014 Total**	**4,040**
1/15	4,000	1/15	--	1,000	3/15	4,000
2/15	4,000	2/15	1,000	1,000	11/15	4,650
3/15	4,000	3/15	--	2,000	--	--
4/15	6,010	5/15	--	2,000	--	--
5/15	4,000	8/15	--	1,000	--	--
6/15	4,470	9/15	--	1,000	--	--
8/15	2,000	--	--	--	--	--
9/15	2,000	--	--	--	--	--
10/15	4,460	--	--	--	--	--
11/15	4,345	--	--	--	--	--
12/15	4,635	--	--	--	--	--
2015 Total	**43,920**	**2015 Total**	**1,000**	**8,000**	**2015 Total**	**8,650**
2/16	4,460	1/16	1,000	1,000	3/16	3,100
3/16	4,456	3/16	1,000	1,000	7/16	3,200
5/16	2,000	4/16	--	1,000	--	--
6/16	2,000	5/16	--	1,000	--	--
--	--	6/16	--	2,000	--	--
--	--	7/16	2,000	--	--	--
2016 Total	**12,916**	**2016 Total**	**4,000**	**6,000**	**2016 Total**	**6,300**

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 Village of Chalykyitsik population in 1990, 2000, and 2010 was 90, 83, and 69, respectively. From 1990 to 2000 the population decreased by approximately 8 percent, and from 2000 to 2010 the population decreased by approximately 17 percent. On average the population has decreased by 12.5 percent every 10 years from 1990 to 2010. If this trend continues, the population may decrease to 61 by 2020 and 54 by 2030. Based on this trend, 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 Tsuk Taih (Chalkyitsik) School has had 11 children in attendance during the 2014/2015 and 2015/2016 school years. 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 Tsuk Taih School.

2.8 METHODS AND FREQUENCY OF FUEL DELIVERY

The CVC provided a fuel transaction record from EAC indicating that they have received fuel via aircraft from EAC since at least 1993. In addition, the YFSD received fuel from AAF via aircraft in 2013 and 2016. Fuel is not delivered by barge.

Based on the Chalkyitsik 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 6,000 gallons within a given month. Occasionally the YFSD will receive larger quantities, 15,000 gallons to 18,000 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 TFs 1, 2, and 4 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 TFs 1, 2, and 4 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 Chalkyitsik, 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 Chalkyitsik 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 TFs 1, 2, and 4; 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 TF4 currently maintain an excess of fuel storage capacity. To meet the fuel storage needs of the CVC power plant and the Tsuk Taih School at TF1 the capacity could be reduced by approximately 19,600 gallons and 20,100 gallons, respectively. To meet the fuel storage needs at the CNCs airstrip facility, TF4, the capacity could be reduced by approximately 4,100 gallons. These capacity reductions would significantly decrease the overall bulk fuel facility repair cost for the Village of Chalkyitsik. With the proposed reductions in capacity, the tanks at each TF considered for improvement alternative option B include:

- TF1: Tanks #1, #2, #3, #11, and #12 for a total of 38,200 gallons
- TF2: Tank #1 for a total of 5,200 gallons
- TF4: Tank #1 for a total of 5,200 gallons

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

In addition to reducing capacity at TF4, the TF could be re-sited to move it off of the Alaska Department of Transportation & Public Facility (ADOT&PF) Chalkyitsik Airport property. A potential new site exists approximately 100 feet northeast of the current TF4 location on property owned by the CVC. The approximate property boundary for the potential new TF4 site is depicted on Drawing A-05.

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: 3,100 square feet
- TF2: 460 square feet
- TF4: 460 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 dry film thickness (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 Chalkyitsik 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 AND REPAIR/INSTALLATION

Secondary containment exists at TF1 but the containment berm and liner are damaged and the containment is not liquid-tight. No secondary containment exists at TF2 and TF4. New secondary containment berms and liners would be installed at each TF location to eliminate the risk of off-site migration of fuel in the event of a release from the TF facilities. 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 east of the village on land owned by the CNC. 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 CNC material site.

The approximate square footage of liner material and volume of aggregate material required to construct secondary containment structures at each TF is listed below.

- TF1 Liner Material: 3,200 square feet
- TF2 Liner Material: 1,100 square feet
- TF4 Liner Material: 1,100 square feet
- Tf1 Aggregate Material: 180 cubic yards
- TF2 Aggregate Material: 80 cubic yards
- TF4 Aggregate Material: 80 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. In addition, raising the power plant and school boiler building feed lines above grade is not feasible as they currently underlie and access road and the school grounds.

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 at TF1 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.

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 tank at TF2 would be retrofitted with an 8-inch emergency vent, steel ball valve, clock-type level gauge, overfill prevention valve, top-fill spill pot, and a manway. A new dispenser would be installed with steel guard posts for traffic protection.

The tank at TF4 would be retrofitted with an 8-inch emergency vent, steel ball valve, clock-type level gauge, overfill prevention valve, top-fill spill pot, and a manway.

3.2.5 ELECTRICAL REPAIR/REPLACEMENT

No electrical exists at TF1 and TF4. The only new electrical proposed for TF1 and TF4 would be wiring for lighting at these facilities.

Code compliant electrical exists at TF2 to power the dispensing pump. If a new dispensing pump is installed minor rewiring would be required. The only new electrical proposed for TF2 would be wiring for lighting at this facility.

3.2.6 TRAINING AND MAINTENANCE IMPROVEMENT RECOMMENDATIONS

To improve bulk fuel facility training and maintenance, the Village of Chalkyitsik 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 Chalkyitsik 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 Chalkyitsik) labor and equipment will be utilized where possible
- Materials and equipment delivery to the Village of Chalkyitsik will be possible by barge
- Two barge loads and up to two truckloads are assumed for transporting materials
- Aggregate material will be provided from the CNC material site; the cost below is assumed
- No rates for heavy equipment were provided by the CVC; the cost below is assumed
- Welding and electrical will be performed by a certified pipe welder and electrician

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, 14 days)	TF1	3,100	SF	$25/SF		$77,500
	TF2	460				$11,500
	TF3	460				$11,500
Travel, Lodging, Meals	All	1	LS			$7,000
					Tank Repair and Painting Total	**$105,500**
Secondary Containment Repair/Installation						
Liner	TF1	3,200	SF	$1.90/SF		$6,080
	TF2	1,100				$2,090
	TF3	1,100				$2,090
Geotextile Fabric (15-foot widths with 3-feet overlap at joints)	TF1	3,540	SF	$0.27/SF		$956
	TF2	1,210				$327

Component / Description	Tank Farm	Quantity	Unit (EA, LF, SF, LS, CY, hr)	Material or Unit Cost	Labor Cost	Total Cost
	TF3	1,210				$327
Sand Bags (Approximately two bales of 1000 each)	All	2	EA	$250 per bale		$500
Aggregate Material	TF1	180	CY	$3.50/CY		$630
	TF2	80				$280
	TF3	80				$280
Chain-link Security Fence	TF1	248	LF	23.00/LF		$5,704
	TF2	156				$3,588
	TF3	156				$3,588
Secondary Containment Labor (Local labor, 4-man crew, 21 days)	All	672	Hr	$24/hr		$16,128
Secondary Containment Repair/Installation Total						**$42,570**
Fuel Pipeline and Header Repair/Replacement						
Galvanic CP System (Approximately 660 feet of pipe)	TF1	Predesign Testing: $6,200; CP Design: $4,900; Materials: $3,500; Commissioning: $7,500				$22,100
Impressed Current CP System (Approximately 660 feet of pipe)		Predesign Testing: $6,200; CP Design: $6,800; Materials: $12,000; Commissioning: $7,500				$32,500
Pneumatic Pressure Testing (1-man crew, 2 days, annually)		$1,250/day; $500/line; $600/travel cost				$3,600/yr
Header Repair (fuel cabinet, swing check valve, ball valve)		1	LS	$4,000	$2000	$6,000
Fuel Pipeline and Header Repair/Replacement Total (assumes CP will not be used)						**$9,600**
Appurtenances Repair/Replacement						
Tanks (emergency vents, ball valves, level gauges, manways	TF1	1	LS	$33,750	$27,500	$61,250
Tank (emergency vent, ball valve, level gauge, prevention valve, spill pot, manway)	TF2	1	LS	$6,100	$5,000	$11,100
Retail Dispenser		1	LS	$12,700	$7,000	$19,700
Tank (emergency vent, ball valve, level gauge, prevention valve, spill pot, manway)	TF4	1	LS	$6,100	$5,000	$11,100
Equipment and Consumables	All	1	LS	$12,400		$12,400
Travel, Lodging, Meals	All	1	LS	NA		$8,000
Appurtenances Repair/Replacement Total						**$123,550**
Appurtenances Repair/Replacement Total Excluding TF1 (School)						**$93,550**
Electrical Repair/Replacement						
Light and Electrical Installation	All	1	LS	$12,900	$7,000	$19,900
Electrical Repair/Replacement Total						**$19,900**

Component / Description	Tank Farm	Quantity	Unit (EA, LF, SF, LS, CY, hr)	Material or Unit Cost	Labor Cost	Total Cost
Freight and Heavy Equipment						
Trucking (Fairbanks to Circle)	All	Up to two loads Maximum capacity of 40,000 lbs/load				$4,000
Barge (Circle to Chalkyitsik)	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	**$61,200**
					Option B Cost Estimate Subtotal	$362,320
					10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)	$163,045
					Option B Cost Estimate Total	**$525,365**
					Option B Cost Estimate Subtotal Without Tank Painting	$256,820
					10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)	$115,570
					Option B Cost Estimate Total Without Tank Painting	**$372,390**
					Option B Cost Estimate Subtotal Without Tank Painting or TF1 (School) Repair	$226,820
					10% Design; 12% Construction Management; 3% Insurance; 20% Contingency (45% Total)	$102,070
					Option B Cost Estimate Total Without Tank Painting or TF1 (School) Repair	**$328,890**

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

3.3 OPTION C: NEW CODE COMPLIANT TANK FARMS

Installation of new code compliant TFs to replace existing infrastructure in the Village of Chalkyitsik 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 TFs 1, 2, and 4 are described below.

3.3.1 DESCRIPTION

The proposed capacities for new code compliant TFs in the Village of Chalkyitsik 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 CVC Power Plant: 20,000 gallons, two 10,000 gallon tanks
- TF1 YFSD School: 20,000 gallons, two 10,000 gallon tanks
- TF2 CNC Retail Store: 4,000 gallons, one 4,000 gallon tank
- TF4 CNC Airstrip: 4,000 gallons, one 4,000 gallon tank

The proposed new code compliant TF gross capacity in the Village of Chalkyitsik would be 48,000 gallons.

The general characteristics under consideration for new code compliant TFs that would be installed in the Village of Chalkyitsik 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 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 and physical damage. 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 TFs 1, 2, and 4; no TF consolidations are proposed. In this case, the existing owners of TFs 1, 2, and 4 would be the participants in the construction of new TFs at these locations.

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.

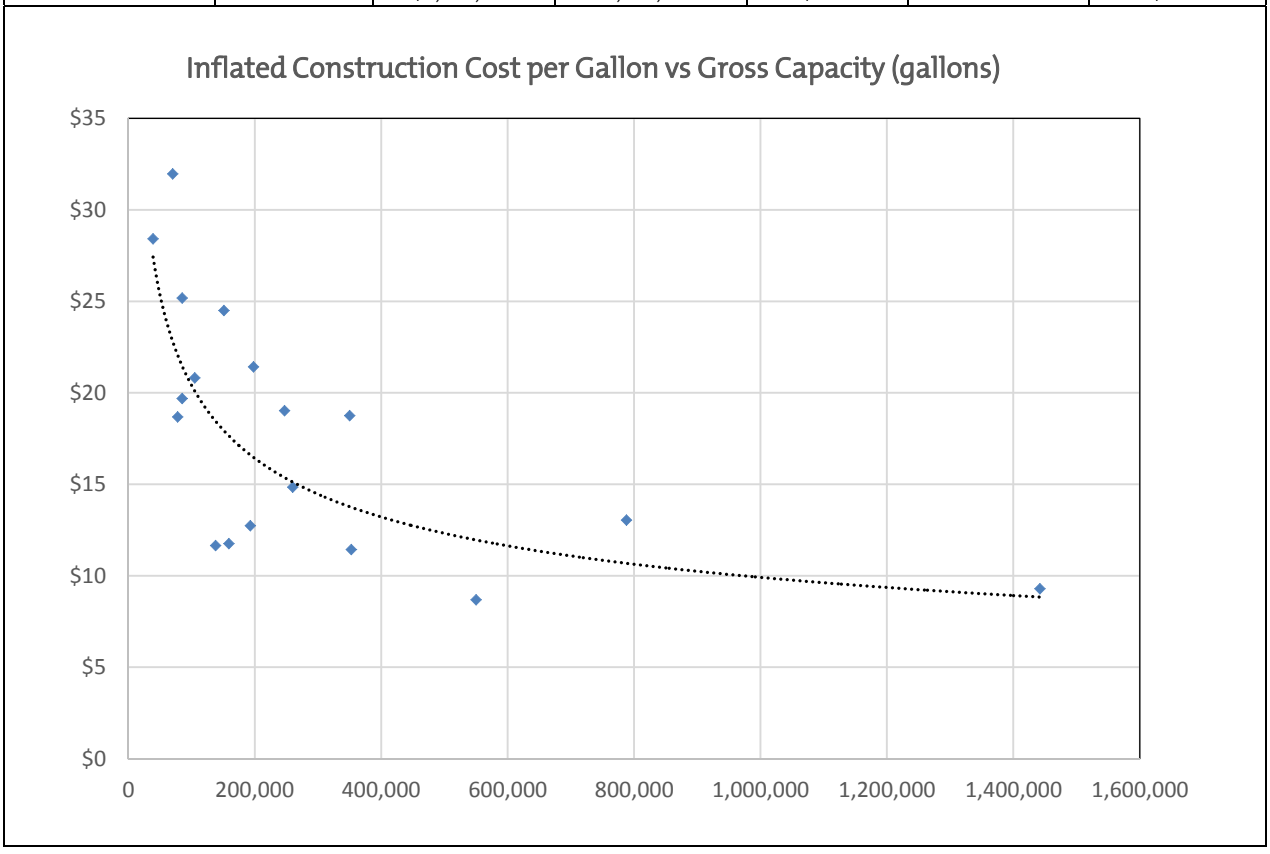
TF4 could be re-sited to move it off of the ADOT&PF Chalkyitsik Airport property. A potential new site exists approximately 100 feet northeast of the current TF4 location on property owned by the CVC. The approximate property boundary for the potential new TF4 site is depicted on Drawing A-05.

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 Chalkyitsik 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 48,000 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 $1,248,000 to 1,632,000.

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 $1,104,000 to 1,440,000.

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 Chalkyitsik 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 Chalkyitsik, 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 EXITING FACILITY 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, and 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 Chalkyitsik. It is recommended that the existing total capacity of approximately 83,800 gallons at TFs 1, 2, and 4 be reduced to 48,600 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 $525,365. 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 $328,890. If repairs resulted in a maximum useable lifetime of 15 years, the repair cost per year of useable lifetime would be approximately $21,900 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 Chalkyitsik 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 48,000 gallons of fuel storage capacity would range from approximately $1,248,000 to 1,632,000. 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 $40,800 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 $21,900 per year for 15 years versus the construction cost of new TFs at $40,800 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 Chalkyitsik. 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 Chalkyitsik 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 Chalkyitsik 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

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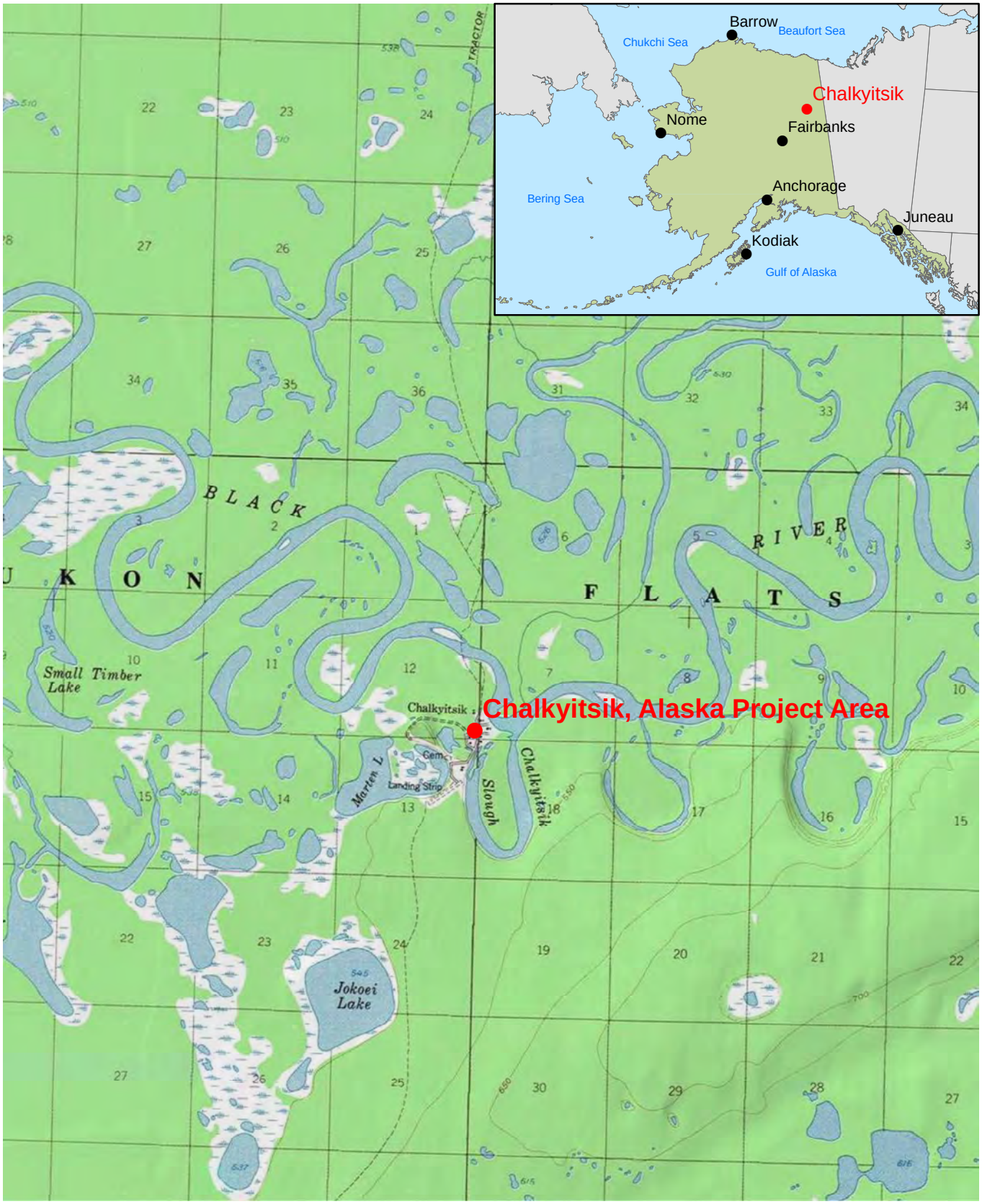
USACE, 2011. *Flood Hazard Data - Beaver*, Alaska. October 2011.

APPENDIX A
SCHEMATIC DRAWINGS AND/OR COMMUNITY SITE PLAN



ALL LOCATIONS ARE APPROXIMATE

0 2,640 5,280 10,560

APPROXIMATE SCALE IN FEET

N

Date Saved: 8/25/2016 12:29:23 PM by ktherrien Z:_GIS\Projects\2415.01 AEA 2016 Bulk Fuel Upgrade Letter Report\Map Documents\Chalkyitsik_A-01_VicinityMap.mxd

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

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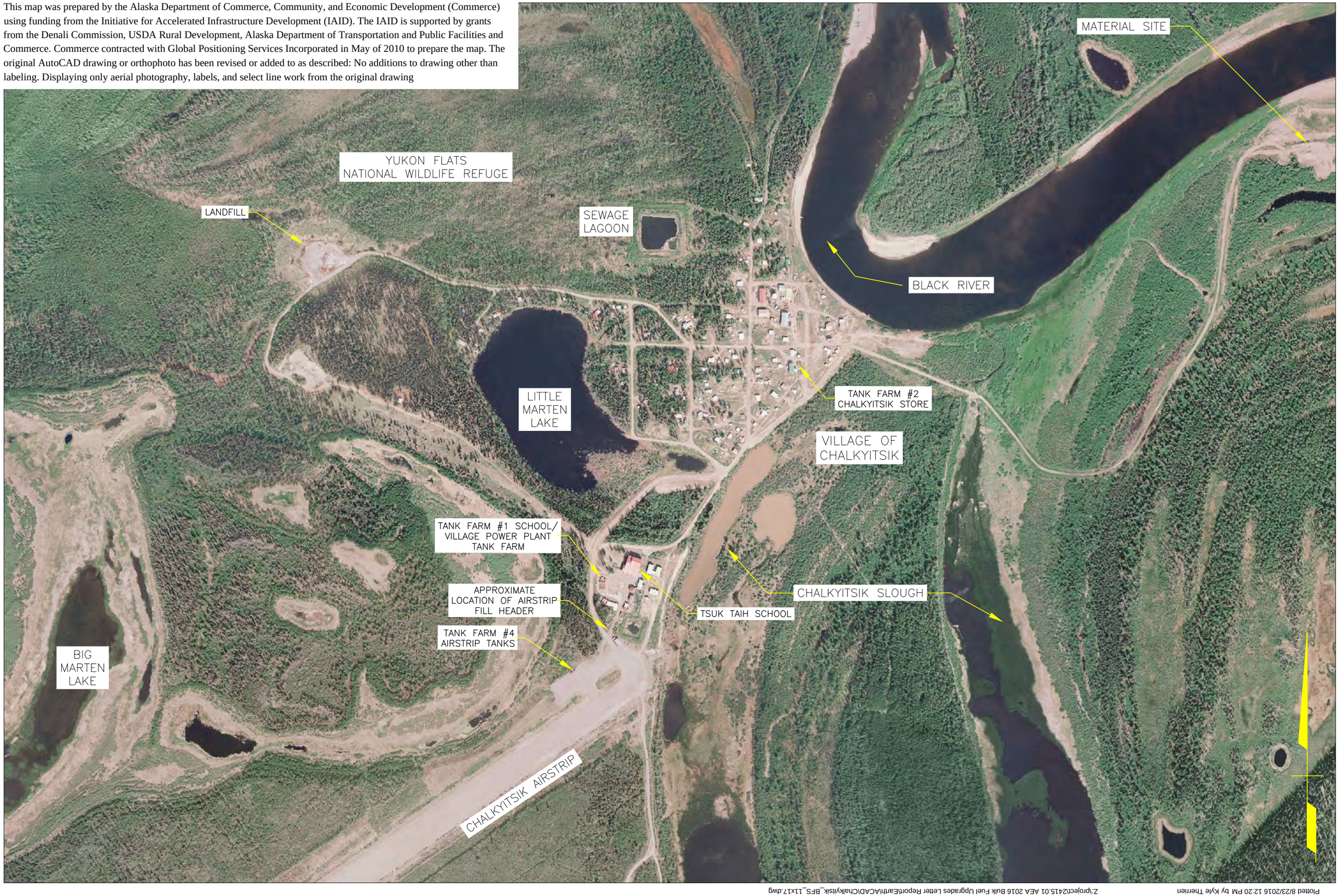
2016 BULK FUEL UPGRADES
CHALKYITSIK, ALASKA

CHALKYITSIK VILLAGE
VICINITY MAP

FB:	N/A
GRID:	BLACK RIVER C-6
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



FB: N/A
GRID: BLACK RIVER C-6
PROJ.NO: 2415.01
DWG.: A-02

2016 BULK FUEL UPGRADES
CHALKYITSIK, ALASKA

CHALKYITSIK VILLAGE
OVERVIEW MAP

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DWN: K.G.T.
CKD: C.H.R.
DATE: AUG 2016
SCALE: 1" : 500 FEET

Plotted 8/23/2016 12:20 PM by Kyle Therren
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Cemetery

FISHHOOK DRIVE

SALMON AVENUE

MARTEN STREET

SCHOOL FEEDER LINE

TSUK TAIH SCHOOL

TANK FARM #1
SCHOOL/VILLAGE POWER
PLANT TANK FARM

TEACHER HOUSING

CHALKYITSIK
SLOUGH

GENERATOR HOUSE
FEEDER LINE

TANK FARM #1
FILL LINE

APPROX. LOCATION OF
AIRSTRIP FILL HEADER

SEWAGE
LAGOON

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FB: N/A
GRID: BLACK RIVER C-6
PROJ.NO: 2415.01
DWG.: A-03

2016 BULK FUEL UPGRADES
CHALKYITSIK, ALASKA

SITE PLAN - TANK FARM #1

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

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FB: N/A
GRID: BLACK RIVER C-6
PROJ.NO: 2415.01
DWG.: A-04

2016 BULK FUEL UPGRADES
CHALKYITSIK, ALASKA

SITE PLAN - TANK FARM #2

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

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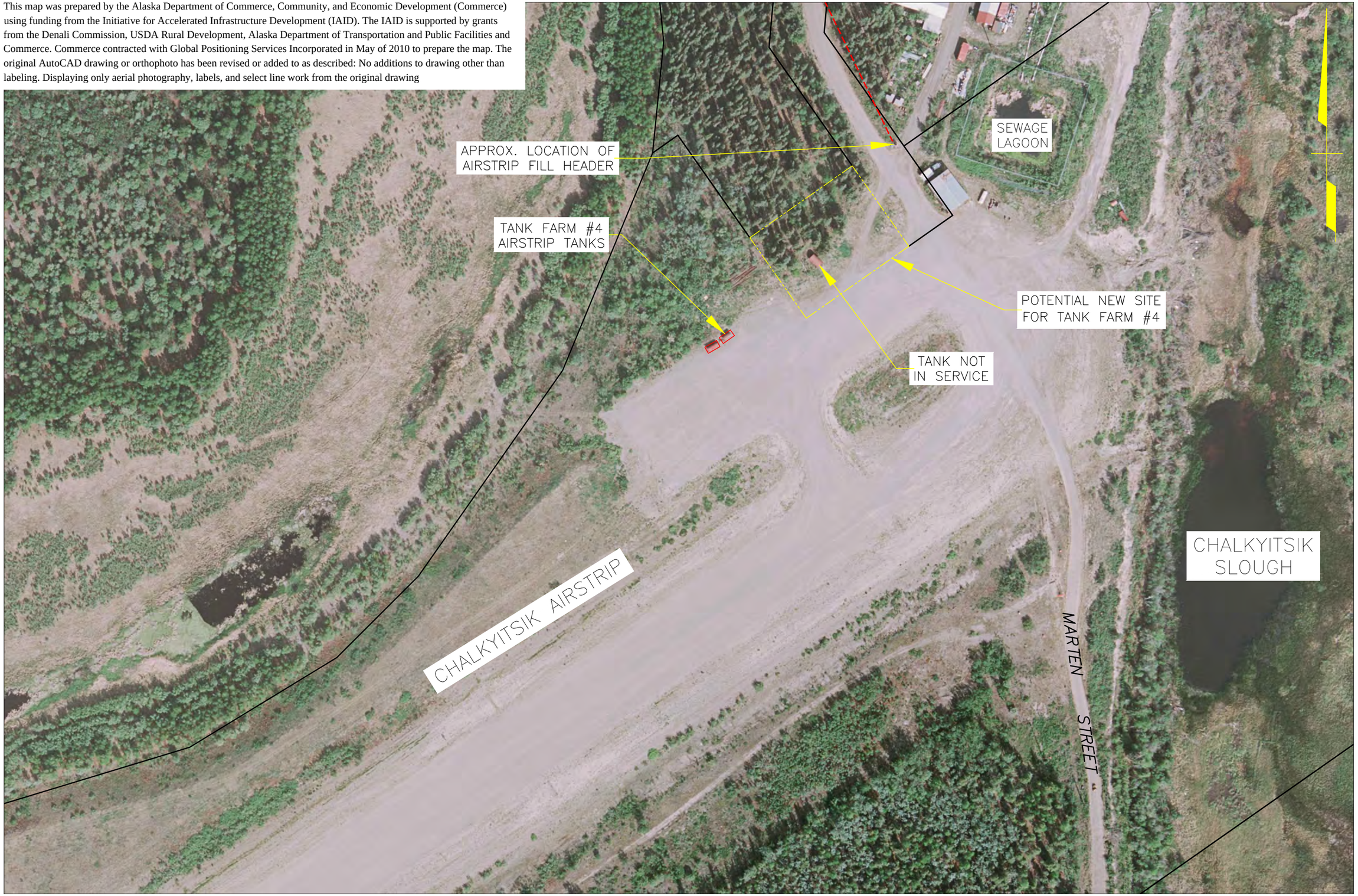

FB: N/A
GRID: BLACK RIVER C-6
PROJ.NO: 2415.01
DWG.: A-05

2016 BULK FUEL UPGRADES
CHALKYITSIK, ALASKA

SITE PLAN - TANK FARM #4

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

Plotted 8/23/2016 12:21 PM by Kyle Therren
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APPENDIX B
CORRESPONDENCE/PHONE NOTES/MEETING NOTES

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Communication Record

Project:	AEA BFU Letter Report – Chalkyitsik	**Project No.**	2415.01
Subject	Site Visit / CNC Fuel Use	**Date:**	7-26-2016
Call To:	Chalkyitsik Native Corporation - Manager	**Telephone No.**	848.8112
Call From:	R&M	**Telephone No.**	458.4306
Discussion Between	Pamela Joseph **and**	Will Rhodes	

W Rhodes notified Pamela of the upcoming site visit and requested historical fuel usage info.

Pamela indicated that CNC is responsible for retail sale of heating oil and gasoline. The CNC owns the Fuel tanker which transfers fuel from the airstrip to TF #2 and end users for heating oil delivery.

She deferred to Everts Air Fuel for providing historical fuel purchase/delivery.

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Communication Record

Project:	AEA BFU Letter Report – Chalkyitsik	**Project No.**	2415.01
Subject	Request for Community Information	**Date:**	7-26-2016
Call To:	Chalkyitsik Village – Tribal Administrator	**Telephone No.**	848-8117
Call From:	R&M	**Telephone No.**	458.4306
Discussion Between	Tamara Henry **and**	Will Rhodes	

Tamara stated that local labor skills included carpentry, heavy equipment operation, welding, Mechanic, etc. A fleet of local construction equipment exists – she referred me to meet with the Roads Director, James Nathaniel during site visit to discuss available construction equipment.

Tamara stated that she would produce and email a fuel purchase record for the Chalkyitsik Village Which buys fuel to support the power plant (TF #1). There is a new Tank Farm Operator (power plant Operator) Chris James. Larry Henry no longer fills this role.

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Communication Record

Project:	AEA BFU Letter Report – Chalkyitsik	**Project No.**	2415.01
Subject	Introduction/Site Visit	**Date:**	7-26-2016
Call To:	Chalkyitsik Village - First Chief	**Telephone No.**	848.8411
Call From:	R&M	**Telephone No.**	
Discussion Between	Woody Salmon **and**	Will Rhodes	

W Rhodes introduced R&M, AEA, and the general project overview and goals. W Rhodes indicated site
Visit plans for 7-28/29 and indicated desire to meet Woody. Woody indicated he would "be around."
W Rhodes queried Woody on lodging – Woody deferred to Yukon Flats School District. W Rhodes
Requested general community information – Woody deferred to Tamara Henry CV Administrator.
Woody deferred to Pamela Herbert – Chalkyitsik Native Corporation for Information on Retail Fuel
Sales (Chalkyitsik Store Tank Farm).

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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.

APPENDIX C
PHOTOGRAPH LOG

Photograph 1: Tank Farm #1 Airstrip Fill Header

Photograph 2: Tank Farm #1; red horizontal tanks are owned by Chalkyitsik Village (Power Plant) and remainder are owned by the Yukon Flats School District (Tsuk Taih school)

Photograph 3: Tank Farm #1 fill line manifold

Photograph 4: Tank Farm #1 school tanks manifold

Photograph 5: Tank Farm #1 power plant tanks manifold

Photograph 6: Tank Farm #1 school tanks

Photograph 7: Tank Farm #1 power plant tanks

Photograph 8: Tank Farm #1 power plant feed line

Photograph 9: Tank Farm #2 retail gasoline tank

Photograph 10: Tank Farm #2 retail gasoline tank

Photograph 11: Tank Farm #2 dispenser feed piping

Photograph 12: Tank Farm #2 dispenser

Photograph 13: Chalkyitsik Native Corporation tanker truck

Photograph 14: Tank Farm #4 airstrip tanks; tank in background not-in-service

Photograph 15: Tank Farm #4 airstrip tanks

Photograph 16: Tank Farm #4 airstrip tanks; tank not-in-service

APPENDIX D

2015 BULK FUEL ASSESSMENT REPORT

CHALKYITSIK, ALASKA

BULK FUEL ASSESSMENT REPORT

Chalkyitsik, Alaska

May 2015

Prepared for:

Alaska Energy Authority

Prepared by:

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

Date: May 14/15, 2015

Assessor: Will Rhodes (ERM)

Community Name: Chalkyitsik, Alaska

Population: 68

Local Government(s): Village of Chalkyitsik, Chalkyitisk Native Corporation

Contact Info: Tamara Henry, Tribal Administrator, 907-848-8117
Robin Jonas, Manager, 907-848-8112

Fuel Suppliers: Everts Air Fuel

Bulk Fuel Storage Facility Info:

When the previous assessment was performed in 1998, the five bulk fuel facilities in the list below were identified and evaluated. Of those facilities only the three facilities shown in bold text are eligible for assistance and are included in this report.

TF1. Chalkyitsik Village Council/Yukon Flats School District – Power Plant/School
TF2. Chalkyitsik Native Corporation – Chalkyitsik Store
TF3. **Chalkyitsik Village Council** – Clinic (less than 1,320 gallons)
TF4. Chalkyitsik Native Corporation - Airstrip Tanks
TF5. State of Alaska D.O.T. – Airstrip Shop (State of Alaska)

Chalkyitsik is located adjacent to the Black River; Tank Farms 2 and 3 are in the active flood plain. The Village of Chalkyitsik maintains the primary power plant, producing electricity using two diesel powered electric generators. The power plant is located adjacent to the Tsuk Taih School (Chalkyitsik School). The Chalkyitsik School currently uses waste heat from the village power plant to heat trace the school's water holding tank and delivery piping. The school maintains two emergency backup generators and uses heating fuel to operate two boilers for space heating. The school and village council power plant fuel tanks are consolidated at Tank Farm 1.

Fuel is delivered to Chalkyitsik by Everts Air Fuel. Fuel is transferred from the airstrip header to Tank Farm 1 through a largely buried pipeline. The Chalkyitsik Native Corporation (CNC) receives and stores heating oil at the airstrip in Tank farm 4. Heating oil is dispensed throughout the village by CNC using a tanker truck. CNC also uses the tanker truck to receive gasoline at the airstrip, and transfers it to Tank Farm 2. Retail gasoline is available at the CNC store.

During the 1998 assessment there were four additional tanks at the airstrip of unknown ownership that were not in use. Two of the four tanks are now in use at Tank Farm 4, one is missing, and one remains unused at the end of the airstrip.

Tank Farm #1 – Power Plant / School

Owner/Phone #: Chalkyitsik Village Council / 907-848-8117
Yukon Flats School District / 907-662-2515

Owner Type: Village Council / School

Location: Adjacent to School/Power Plant

Total Evaluation Score (See Scoring Sheet): 65 (240 max)

Regulatory Plans Available: ☒ No ☐ Yes

Spill Response Equipment: ☐ No ☒ Yes; Sorbent pads in Power Plant

Operator/Training/ Years on the Job: Larry Henry/no formal training/20 years

Distance from Moorage to Barge Header: No Barge Header

Facility Description:

The Chalkyitsik School and the Chalkyitsik Village Council have consolidated their tanks into this single facility located at the school site, near the airstrip. The school has seven heating fuel bulk storage tanks in the main dike (Tanks 1-7) as well as four additional 275 gallon heating fuel gravity feed day tanks, one each located at the boiler building and three staff housing quarters (Tanks 8-10 and 14). The school's heating fuel is used exclusively for space heating. The village has 4 diesel fuel tanks in the main dike (Tanks 11-13), and one 275 gallon day tank located in the power plant. The village fuel is used exclusively for village electric power generation.

School Tanks 1-6 are single wall, vertical, welded steel tanks. They are supported on a platform constructed of 4x12 timbers laid directly on the dike fill material. These six tanks have normal vents and 18-inch manholes but no emergency vents. There are also bottom mounted threaded fuel withdrawal and water draw connections. School Tank 7 as well as village Tanks 11-13 are single wall, horizontal, skid mounted, welded steel tanks. The tank skids are supported on a solid layer of 4x12's laid directly on the dike fill material. They have normal vents and 18-inch manholes but no emergency vents. They also have bottom mounted, threaded fuel withdrawal and water draw connections. School Tanks 8–10 are single wall, horizontal, welded steel tanks supported on 8-foot tall stands constructed of light wood framing material. They have normal vents but no manholes or emergency vents. These tanks also have threaded, top mounted fuel supply and return connections as well as threaded, bottom mounted water draw connections with threaded bronze valves throughout.

All of the manifold piping in the diked portion of this facility is 2.5-inch and 3-inch welded steel pipe with flanged steel gate valves, check valves and flex connectors. There are no pressure relief valves. A 2-inch welded steel pipeline runs approximately 200-feet, mostly

below grade, from the school tank manifold to the school's boiler building, where the fuel transfer pump is located. The distribution piping from that point to the three day tanks is a combination of above and below grade, welded and threaded 1-inch to 1.5-inch steel pipe with bronze gate valves. A 2.5-inch welded steel pipeline runs from the village tank manifold approximately 200-feet to the village power plant, mostly below grade.

Tanks 1-7 and 11-13 are contained within the 2-foot high lined, earthen berm dike which has visible tears and is not liquid tight according to the tank farm operator. Tanks 8-11 and 14-15 have no secondary containment. There is no fencing around the diked area.

Both the school and village receive fuel at the airstrip provided by Everts Air Fuel. Fuel is transferred through a shared 3-inch, welded steel fill pipeline running approximately 350 feet from the airstrip header to Tank Farm #1. There is a flanged steel gate and check valve as well as catch basin at the fill airstrip header.

Tank Farm 1 - Chalkyitsik 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	9'	13'	V	SW	D1	Y	BF	40+	UNK	6,200
2	9'	13'	V	SW	D1	Y	BF	40+	UNK	6,200
3	9'	13'	V	SW	D1	Y	BF	40+	UNK	6,200
4	8'	13'	V	SW	D1	Y	BF	40+	UNK	4,900
5	8'	13'	V	SW	D1	Y	BF	40+	UNK	4,900
6	8'	13'	V	SW	D1	Y	BF	40+	UNK	4,900
7	8'	14'3"	H	SW	NIS	Y	BF	40+	UNK	5,400
8	2'	4'x6'	H	SW	D1	Y	BF	40+	UNK	275
9	2'	4'x6'	H	SW	D1	Y	BF	40+	UNK	275
10	2'	4'x6'	H	SW	D1	Y	BF	40+	UNK	275
11	8'	27'	H	SW	D1	Y	BF	40+	UNK	9,800
12	8'	27'	H	SW	D1	Y	BF	40+	UNK	9,800
13	8'	27'	H	SW	D1	Y	BF	40+	UNK	9,800
14	2'	4'x6'	H	SW	D1	Y	BF	40+	UNK	275
15	2'	4'x6'	H	SW	D1	Y	BF	40+	UNK	275
									Total Gallons	**69,475**

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, **NIS** = Not In Service. **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 fair to poor condition.

Tank Farm 1 - Evaluation Score:

Facility Category	Possible Points	Awarded Points
Site Location		
Site suitable for tank farm	0 points	0
< 100 feet from a public well	10 points	
< 25 feet from an eroding bank or beach, or history of flooding	10 points	
Gasoline tanks < 25 feet from an important building	10 points	
	30 points max.	**0**
Secondary Containment		
*Liquid-tight, lined dike of proper volume and construction, or double wall or self diked tanks	0 points	0
*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	
*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	
	80 points max.	**10**
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.**	**65**

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

Tank Farm 1 - Photos:

Photo 1 – Tank Farm 1 Airport Header

Photo 2 –Tank Farm 1

Tank Farm 1 - Photos:

Photo 3 – Manifold For School Tanks

Photo 4 – Manifold for Power Plant Tanks

Tank Farm #2 – Chalkyitsik Store

Owner/Phone #: Chalkyitsik Native Corporation / 907-848-8112

Owner Type: Native Village Corporation

Location: Adjacent to Chalkyitsik Store near the center of the village.

Total Evaluation Score (See Scoring Sheet): 75 (Max 240)

Regulatory Plans Available: ☒ No ☐ Yes

Spill Response Equipment: ☒ No ☐ Yes

Operator/Training/ Years on the Job: Larry Henry/no formal training/20 years

Distance from Moorage to Barge Header: No Barge Header

Facility Description:

The CNC owns and operates this facility which is used to dispense gasoline for retail sales. Gasoline is purchased from Everts Air fuel at the airstrip and is delivered to Tank 1 by the CNC tanker truck. Retail heating fuel is stored at the airstrip (Tank Farm 4) and is transferred and sold directly from the CNC tanker truck. Tank 2 is a small heating fuel tank located adjacent to the store, and is used for space heating. There is currently no secondary containment, security fencing, or lighting.

Tank 1 is a single wall, horizontal, skid mounted, welded steel tank resting directly on the ground. The tank has a normal vent, but no emergency vent or manhole. There is a threaded, top mounted fuel withdrawal connection and a threaded, bottom mounted fill or water draw connection. The tank is connected to the dispensing pump through unsupported 1.5-inch welded steel, flanged pipe. The pipe runs from top mounted fuel withdrawal connection to the ground adjacent to the dispensing pump, where it drops below grade to connect to the dispensing pump. There is one threaded bronze gate valve and a pressure relief valve but no check, fusible link, or solenoid valves. Electric power is supplied by direct bury cable routed from the store. The dispensing pump is less than 20' from the tank and there is no fencing or traffic protection for the tank or the dispensing pump.

Tank 2 is a 300 gallon heating fuel tank set on a wood stand about 3 feet tall. Bottom mounted 1.5-inch threaded steel distribution pipe runs from the tank into the building. There is a bronze gate valve at the tank outlet and a normal vent present. Both tanks appear to be in good condition.

Tank Farm 2 - Chalkyitsik										
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'	14'4"	H	SW	G	Y	RD	31+	UNK	5,200
2	5'1"	3'2"	H	SW	D1	Y	BF	31+	UNK	300
									Total Gallons	**5,500**

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 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 addressing deficiencies noted above.

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	
*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	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	5
*Threaded piping above grade	10 points	
*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	
	80 points max.	**5**
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.**	**75**

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

Tank Farm 2 - Photos:

Photo 1 –Tank 1

Photo 2 – Retail Gasoline Dispenser

Tank Farm #4 – Airstrip Tanks

Owner/Phone #: Chalkyitsik Native Corporation / 907-848-8112

Owner Type: Native Village Corporation

Location: Northeast end of Airstrip

Total Evaluation Score (See Scoring Sheet): 120 (240 Max.)

Regulatory Plans Available: ☒ No ☐ Yes

Spill Response Equipment: ☒ No ☐ Yes, None Observed

Operator/Training/ Years on the Job: Larry Henry/No Formal Training/20 years

Distance from Moorage to Barge Header: No Barge Header

Facility Description:

The CNC owns these three tanks staged at the airstrip for diesel fuel storage. Currently Tank 1 is not in service and the plan for future use is unknown. The tank has not been taken out of service in compliance with State and Federal regulations at this point.

The tanks are welded steel, horizontal, and single-wall. Tank 2 is skid-mounted with a threaded top-mounted fuel fill/draw fitting and a threaded bottom-mounted water draw fitting and has a normal vent. No piping or hose is connected to Tank 2. The belly of Tank 3 is resting on the ground amidst a failing timber foundation. Tank 3 has a threaded bottom-mounted fuel fill/draw port connected to a steel ball valve and blue hose attached with cam-lock fittings. The tanks do not have overfill protection. No security fencing or secondary containment is present.

Tank Farm 4 – Chalkyitsik										
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'	14'	H	SW	G	Y	NIS	30+	UNK	5,200
2	5'3"	12'4"	H	SW	D1	Y	BF	30+	UNK	2,000
3	6'3"	9'3"	H	SW	D1	Y	BF	30+	UNK	2,100
									Total Gallons	**9,300**

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, **NIS** = Not In Service. **LISTING**: **UL** = Underwriters Laboratories, **STI** = Steel Tank Institute, **API** = American Petroleum Institute, **UNK** = Unknown.

Tank Farm 4 - 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. Tank farm is in poor condition.

Tank Farm 4 - Evaluation Score:

Facility Category	Possible Points	Awarded Points
Site Location		
Site suitable for tank farm	0 points	0
< 100 feet from a public well	10 points	
< 25 feet from an eroding bank or beach, or history of flooding	10 points	
Gasoline tanks < 25 feet from an important building	10 points	
	30 points max.	**0**
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	
*Tanks directly on tundra or natural soils (no dike or liner, subject to erosion)	10 points	10
Tanks leaning considerably or unstable foundations (seismic hazard)	10 points	
	20 points max.	**10**
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	
***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.**	**120**

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

Tank Farm 4 - Photos:

Photo 1 – Tank 2

Photo 2 – Tank 3