



October 1, 2002

Mr. Mark Schimsheimer
Alaska Energy Authority/Rural Energy Group
813 West Northern Lights Blvd.
Anchorage, AK 99503

Re: Fuel System Evaluation
Kwigillingok and Kongiganak Schools

Dear Mr. Schimsheimer:

Per your request, I have inspected the existing fuel systems at the Kongiganak and Kwigillingok Schools, and offer the following evaluation of the existing systems and upgrade alternatives.

The Schools in Kongiganak and Kwigillingok are owned and operated by the Lower Kuskokwim School District (LKSD). Both Schools utilize fuel oil for building heating and main/back-up power generation. The fuel systems at both of these Schools were initially installed 10-20 years ago, with additional tanks and piping added as new buildings were constructed.

I inspected both School fuel systems on August 7, 2002. While on site, I met with Mr. Nicholas David, the Kongiganak School Maintenance Supervisor and with Mr. Steven Evon, the Kwigillingok School Maintenance Supervisor, to discuss the existing fuel systems. I also contacted Mr. Shane Campbell, LKSD's Facilities Manager, to discuss the existing and potential upgrade alternatives.

The findings of my evaluation are as follows:

EXISTING FUEL SYSTEMS

Kongiganak: The Kongiganak School bulk fuel storage tank farm is being replaced with a new tank co-located with the new Traditional Council and Corporation tank farm north of the School. The new bulk tank feeds a new 12,000-gallon double-walled tank located adjacent to the School's back-up generator. Upon receipt of fuel in the new tank farm this fall, the School and associated buildings will be supplied fuel through the 12,000-gallon tank. The 12,000-gallon tank is connected to the existing fuel distribution system, which feeds five existing building tanks that range from 300 to 800-gallon capacity. The building tanks are located at the School, back-up generator, outbuildings and teacher housing units. Four additional building tanks and two 55-gallon drum heating oil supply tanks are filled from barrels using a

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portable pump. One 300-gallon tank has been removed from service since the building it served has been demolished.

The building tanks are elevated to allow gravity feed of fuel to the heating systems in the buildings. Some of the tanks are elevated on steel frames, while the other tanks are set on timber stands. See the attached Existing Kongiganak School Fuel System Layout drawing for the current configuration. It is understood that the existing bulk fuel tanks are to be removed, and a new water tank installed on the platform after the new bulk tank farm is brought on line.

The new 12,000-gallon tank is equipped with a manually operated transfer pump, which is plumbed into the existing school fuel distribution system. As with the previous distribution system, the fuel transfer pump is manually started and the receiving building tank valve is opened to start filling. The transfer is monitored and the receiving tank valve is closed when the tank is full, then the transfer pump is shut-down. The receiving tanks do not have overfill prevention devices. Several of the out-building heating systems are not connected to the distribution pipeline. These tanks are filled from portable containers that are hauled to the tank.

The new bulk tank is located inside a steel secondary containment area at the new co-located bulk tank farm, and the new 12,000-gallon tank is double-walled to provide secondary containment. Only two of the individual building tanks are located in secondary containment structures and none of the tanks are double-walled.

Kwigillingok: The Kwigillingok School stores bulk fuel behind the School in two tanks. The fuel is pumped from the bulk tanks to six smaller building tanks (300/500-gallons each) located at the School, back-up generator, and teacher housing units through a network of piping. One additional 500-gallon tank is located near the School's shop/storage buildings, but has been disconnected from the piping system. See attached Existing Kwigillingok School Fuel System Layout drawing for the fuel system configuration.

Fuel is transferred from the bulk tanks through a fixed pump located in the tank farm. The pump is manually controlled, with the operator starting the pump, then opening the selected receiving building tank valve to start the transfer. The transfer is monitored and the receiving tank valve closed when the tank is full and the transfer pump manually shut-off. The receiving tanks do not have overfill prevention devices.

The bulk tanks are located inside a timber diked secondary containment system that is in poor condition. The smaller tanks are single-walled and lack secondary containment.

UPGRADE ALTERNATIVES

The existing fuel distribution systems at both of these Schools present a risk of overfilling the building tanks due to the lack of overfill prevention measures and the potential for inadvertently overfilling a tank that is not being monitored due to open, or leaking valves. The systems are dependent upon the operator correctly configuring the system's valves and continuously monitoring fuel transfers to prevent fuel spills. In addition, the existing smaller tanks lack adequate secondary containment to meet the EPA's Spill Prevention Control and Countermeasures (SPCC) Plan requirements (40 CFR Part 112).

Several means of overfill prevention are commonly used for piped fill systems. These measures include:

- Fill limiting valves that shut-off flow into the tank when the liquid level reaches a predetermined depth;
- High-level switches to shut-off transfer pumps;
- High-level switches to close electrically operated valves (solenoid valves, actuated ball valves, etc.);
- High level alarms to notify operators of an overfill situation;
- Liquid level gauges to allow the operator to quickly determine the fuel level in the tank.

Typically, several of these measures are used together to limit the potential for tank overfilling.

The use of high-level switches to control pumps and control valves becomes a problem when multiple tanks are to be filled from one pump. The complexity of a pump control system that allows filling of tanks on a common distribution system once one tank signals to shut off the pump, is very difficult to trouble-shoot and maintain. Past projects, which have attempted to control pumps filling multiple receiving tanks in this manner, have encountered many operational and maintenance problems that have resulted local operators by-passing of the safety features to get fuel, creating a worse condition than the original transfer system. For this reason, a complex pump control system is not recommended and not presented in this report.

Meeting the EPA's secondary containment requirements can be accomplished by installing secondary containment basins at each tank with a storage capacity larger than 55-gallons, or installing double-walled tanks with EPA required overfill prevention measures (liquid level gauge, high level signal and a high level flow shut-off system).

As previously stated, this report is intended to evaluate alternate upgrade options for upgrading the fuel systems at both Schools. After consideration of various options,

there appears to be only three basic alternatives. Many variations on the following alternatives may be possible, however, these alternatives represent the basic concepts. Each of these alternatives includes connecting all buildings that use fuel oil to the distribution system, even those that are not currently connected, to minimize fuel handling and the associated risk of a spill. In addition, the School building and Back-up Generator in Kongiganak are to be fed directly from the new 12,000-gallon intermediate tank using the existing fuel pumps located in each buildings fuel system.

- Alternate 1 – Upgrade Existing System. Includes upgrading existing building tanks, installing new tanks to replace barrels, installing secondary containment basins and installing a new distribution piping system and controls.
- Alternate 2 – Replace Existing Tanks. Includes the installation of new double-walled tanks to replace all existing building tanks and installation of a new distribution piping system and controls.
- Alternate 3 – Install New Fuel System. Includes removal of all existing building tanks and installation of a single new double-walled tank to supply all teacher housing and outbuildings, and a new distribution piping system.

A discussion of each of these options is as follows:

Alternate 1 - Upgrade Existing System: This alternate includes upgrading the existing building tanks to include a fill limiting valve, high-level alarm and a liquid level gauge. Due to the size of the openings in the existing tanks, new penetrations will have to be cut into the tanks to install this new equipment. In addition, each tank will be located in a steel secondary containment basin and elevated on a steel rack to maintain the gravity feed supply to the buildings. New tanks will be purchased to replace barrel tanks that provide primary fuel supply to a building. See the attached Alternate 1 Proposed Kongiganak, or Kwigillingok, School Fuel System Upgrade drawings for layout.

Upgrades to the piping systems will include the use of Schedule 80, 2-inch piping to connect each building tank to the existing submersible pump in the 12,000-gallon tank in Kongiganak and to a new transfer pump system in Kwigillingok. The heavy walled pipe will provide mechanical strength for impact resistance and corrosion allowance.

The Kongiganak transfer pump system will be upgraded by adding a timer to limit how long the pump will run. The timer will be set to deliver less than 500-gallons, to prevent overfilling should the pump be left running. The new Kwigillingok transfer pump system will also incorporate a timer.

The Conceptual Cost Estimates for this option are \$251,000 for Kongiganak and \$241,000 for Kwigillingok. See the attached Conceptual Cost Estimates for detailed breakdowns.

Alternate 2 – Replace Existing Tanks: This alternative is similar to Alternate 1, however, instead of refurbishing the tanks, new 500-gallon double walled tanks will be installed. The tanks will include a fill limiting valve, high-level alarm and a liquid level gauge as required by the EPA for using double-walled tanks. The tanks will have to be raised on steel racks to maintain gravity feed to the buildings.

The new tanks will be supplied fuel from either the 12,000-gallon intermediate tank in Kongiganak, or the bulk tanks in Kwigillingok. The distribution piping will be the same as presented in Alternate 1, using Schedule 80, 2-inch pipe. See the attached Alternate 2 Proposed Kongiganak, or Kwigillingok, Proposed Fuel System Upgrade drawings for more details.

The Kongiganak transfer pump system will be upgraded by adding a timer to limit how long the pump will run. The timer will be set to deliver less than 500-gallons, to prevent overflowing should the pump be left running. The new Kwigillingok transfer pump system will also incorporate a timer.

The Conceptual Cost Estimates for this option are \$252,000 for Kongiganak and \$235,000 for Kwigillingok. See the attached Conceptual Cost Estimates for detailed breakdowns.

Alternate 3 – New Fuel System: This alternative replaces the existing building tanks with one, or two, new double-walled tank(s). The new tank in Kongiganak would have a capacity of 4,000-gallons and would feed all of the buildings. Two 2,000-gallon tanks would be installed in Kwigillingok. These tanks would be double-walled with a fill limiting valve, high-level alarm and liquid level gauge. The tank would be raised on piling to provide gravity feed to each of the buildings through network of supply lines. See the attached Alternate 3 Proposed Kongiganak, or Kwigillingok, School Fuel System Upgrade for more details.

The single new tank would be filled from the 12,000-gallon tank in Kongiganak using the existing submersible pump with a new timer, or from the bulk tanks in Kwigillingok through a new distribution pump system that incorporates a timer. Both School systems would include the use of new Schedule 80, 2-inch fuel distribution lines. Fuel would be supplied to the buildings through new Schedule 80, 2-inch piping.

The Conceptual Cost Estimates for this option are \$395,000 for Kongiganak and \$403,000 for Kwigillingok. See the attached Conceptual Cost Estimates for detailed breakdowns.

CONCLUSIONS

School fuel systems like the ones used at the Kongiganak and Kwigillingok Schools have presented a difficult obstacle to village wide fuel system upgrade projects conducted by the Alaska Energy Authority. These projects provide upgrades to bulk fuel tank farms and distribution systems, but typically stop short of upgrading the School distribution systems due to their complexity and the difficult application of the larger fuel system design philosophy.

Through lessons learned in previous villages, transferring fuel from one tank to multiple receiving tanks becomes extremely complex if redundant fail-safe overfill prevention systems are incorporated. This leads to difficulties in trouble-shooting and repair, which ultimately lead to bypassing the fail-safe systems, raising the risk of a spill. In some instances, the resulting risk of spill is higher than the system it replaced.

The three alternate fuel system upgrades either upgrade the existing systems, leaving them relatively unchanged from an operations view-point, or replace them with one or two new tanks that includes redundant overfill prevention measures such as fill limiting valves and pump shut-off controls. In terms of spill prevention, the use of a single tank to supply all the buildings lessens the risk of tank overfilling; however, the increased amount of supply lines to each of the buildings increases the risk of pipe failure. If one of the supply lines were to fail, the entire contents of the tank would likely be spilled. Since the tank must be larger to supply multiple buildings, the size if a spill is significantly higher. Given this increased risk, and the risk of fuel supply problems to a single tank impacting all of the buildings at once, this alternative does not provide a better system than already installed.

Considering the benefits of Alternates 1 and 2, upgrading with refurbished existing tanks versus new double-walled tanks, the use of the single-walled tanks with secondary containment basins provides the better spill prevention system. Since the use of either tank includes fill-limiting valves, high-level alarms and liquid level gauges, the means of secondary containment makes the difference. Double-walled tanks do not provide secondary containment in the event of a tank overfill (in case of a failure of the overfill prevention measures), while a steel secondary containment basin system would. This basin would also contain leaks at the tank from the supply piping into the building. Therefore, the use of single walled tanks in a secondary containment basin provides the best means of secondary containment.

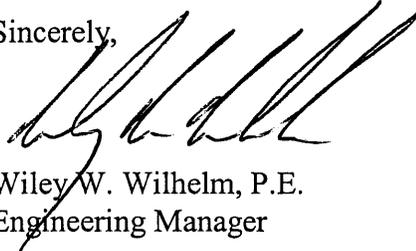
In addition to providing the best means of secondary containment, the reuse of the existing building tanks is similar to the cost to provide double walled tanks. The estimated construction cost for Alternate 1 in Kongiganak is slightly lower than Alternate 2 (approx. \$1,000 less) and the estimated construction cost for Alternate 1 in Kwigillingok is slightly higher than Alternate 2 (approx. \$5,000 more).

Due to the high cost for field labor, a fourth alternative was evaluated. See attached Conceptual Cost Estimates for Kongiganak and Kwigillingok. Alternate 4 is the same as Alternate 1, but substitutes new tanks in place of the re-furbished tanks, eliminating field welding of new penetrations into the existing tanks. The resulting savings brings the estimated cost for Alternate 4 in Kongiganak to \$224,000, and down to \$212,000 in Kwigillingok, saving more than \$27,000 in each village, making Alternate 4 the lowest cost alternate.

In summary, I recommend that the existing fuel systems at both Schools be replaced with a similar system utilizing new single walled building tanks with overflow prevention devices with a secondary containment basin, and new distribution systems with timers to limit the amount of fuel transferred in one operation. These new systems will provide the best long term overflow prevention system while meeting State and Federal codes/regulations at the lowest upgrade costs.

I hope that this evaluation adequately addresses the alternate methods of upgrading the School fuel distribution systems. Please feel free to contact me at (907) 273-1851 if you have any questions or comments.

Sincerely,



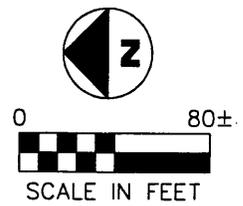
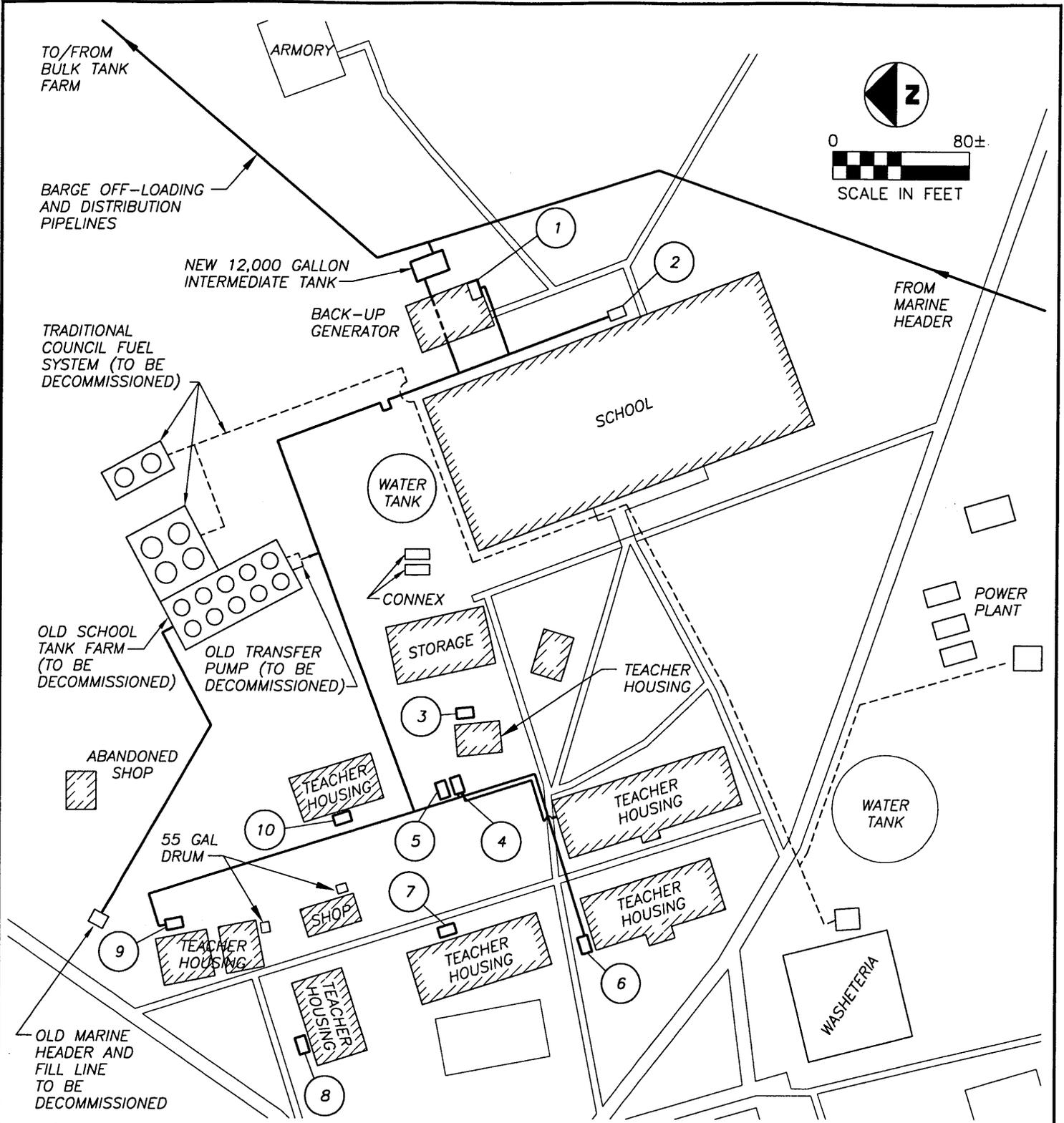
Wiley W. Wilhelm, P.E.
Engineering Manager

WWW:www:02-710

Attachment: Existing Kongiganak School Fuel System Layout
Alternate 1 - Proposed Kongiganak School Fuel System Upgrade
Alternate 2 - Proposed Kongiganak School Fuel System Upgrade
Alternate 3 - Proposed Kongiganak School Fuel System Upgrade
Existing Kwigillingok School Fuel System Layout
Alternate 1 - Proposed Kwigillingok School Fuel System Upgrade
Alternate 2 - Proposed Kwigillingok School Fuel System Upgrade
Alternate 3 - Proposed Kwigillingok School Fuel System Upgrade
Kongiganak School Fuel Upgrade Conceptual Cost Estimates (1,2,3&4)
Kwigillingok School Fuel Upgrade Conceptual Cost Estimates (1,2,3&4)

PLOTTING DATE: 10/02/02 (08:28)

AUTOCAD DRAWING NAME: 710-LM.DWG



TANK#	SIZE	FILL METHOD	TANK#	SIZE	FILL METHOD
1	500 GALLON	PIPED	6	300 GALLON	PIPED
2	800 GALLON	PIPED	7	300 GALLON	HAULED
3	500 GALLON	HAULED	8	300 GALLON	HAULED
4	500 GALLON	PIPED	9	300 GALLON	PIPED
5	300 GALLON	DISCONNECTED (NOT IN USE)	10	650 GALLON	HAULED

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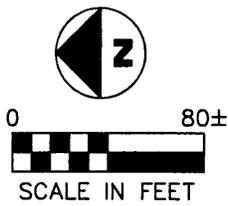
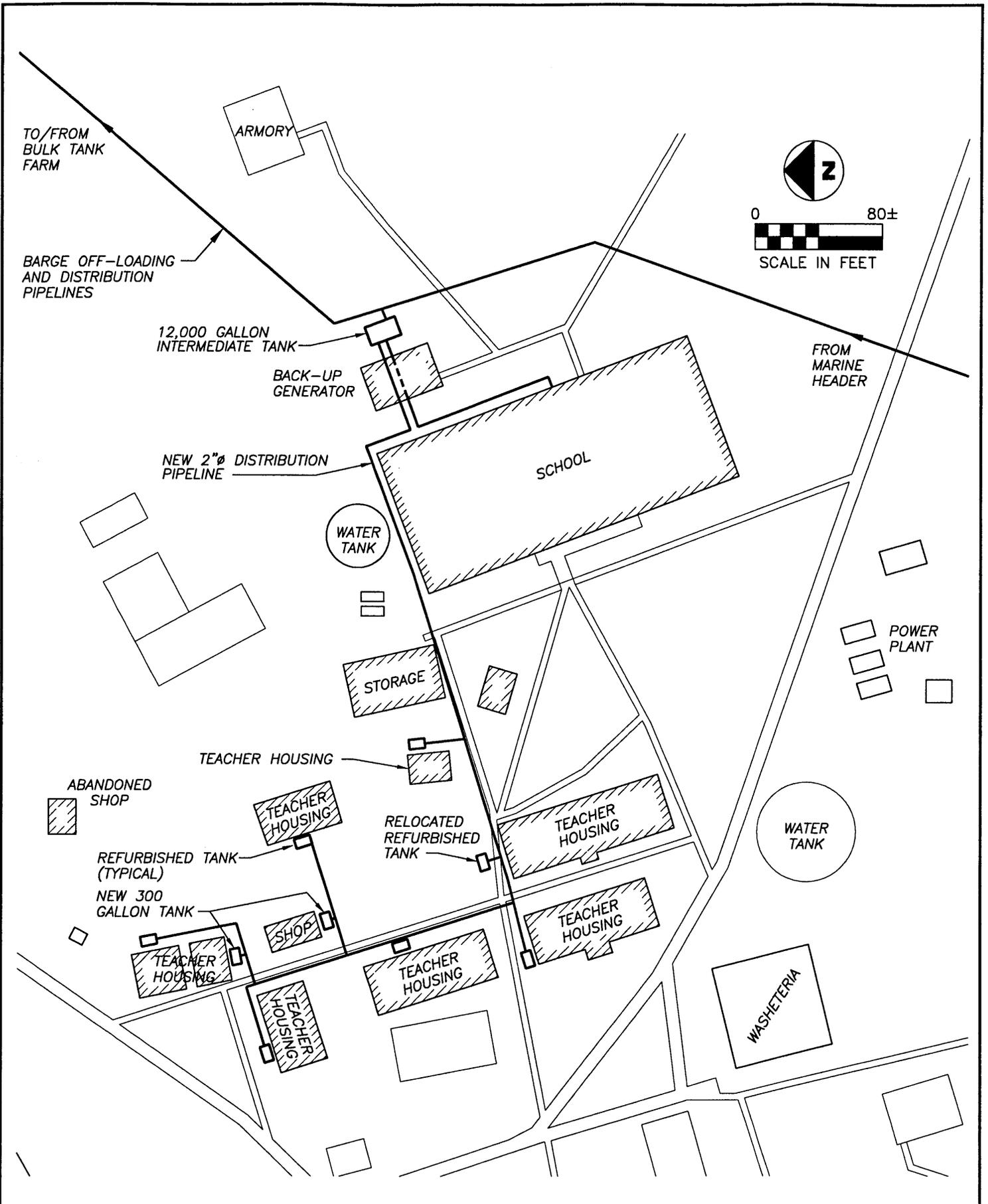
EXISTING KONGIGANAK SCHOOL FUEL SYSTEM LAYOUT

KONIGIGANAK, ALASKA

DATE: 9/27/02	DRAWN BY: CR/KK	SHEET: 1 OF 4
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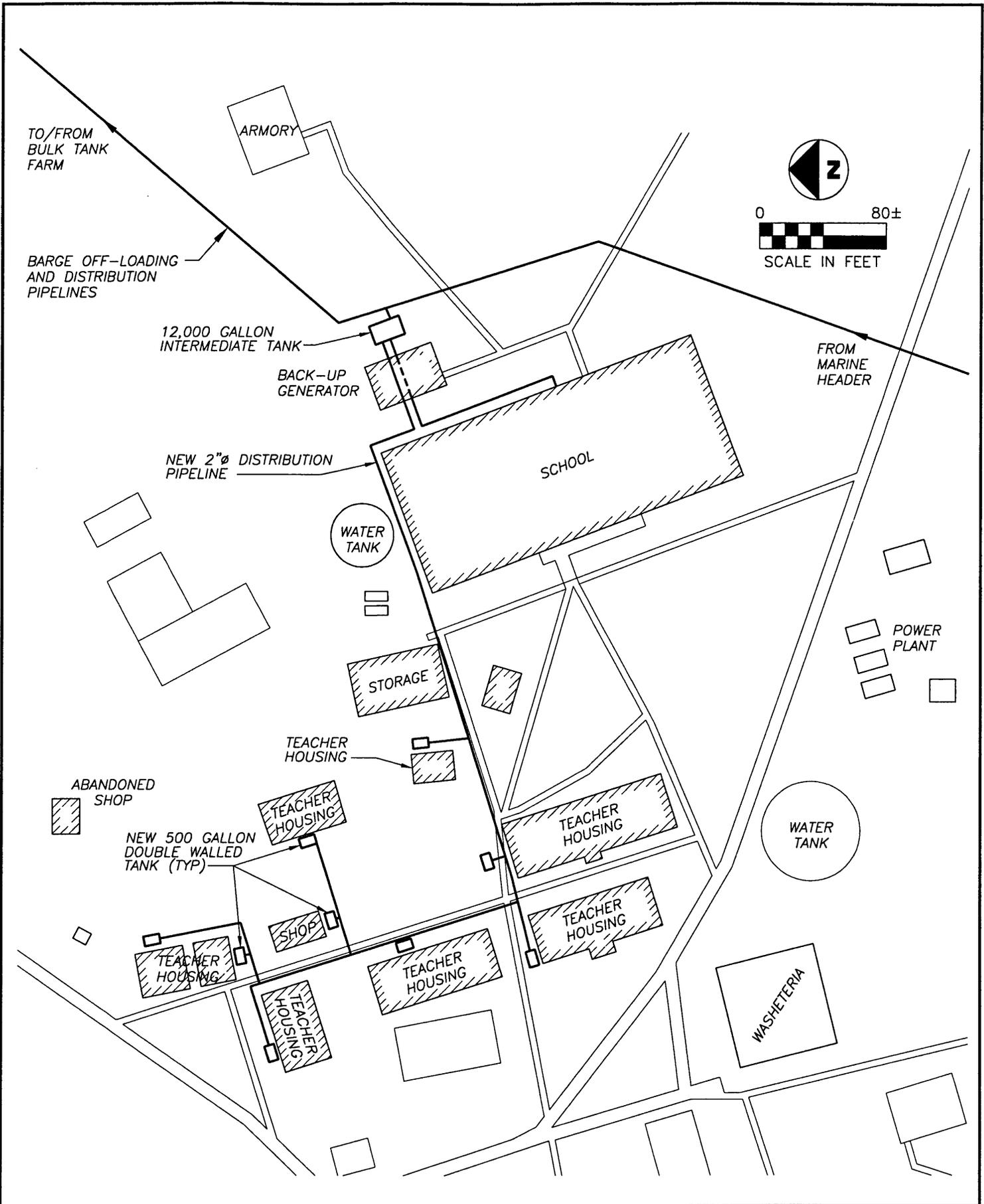


**ALTERNATE 1
 PROPOSED KONGIGANAK
 SCHOOL FUEL SYSTEM UPGRADE**
 KONGIGANAK, ALASKA

DATE: 9/27/02	DRAWN BY: CR/KK	SHEET: 2 OF 4
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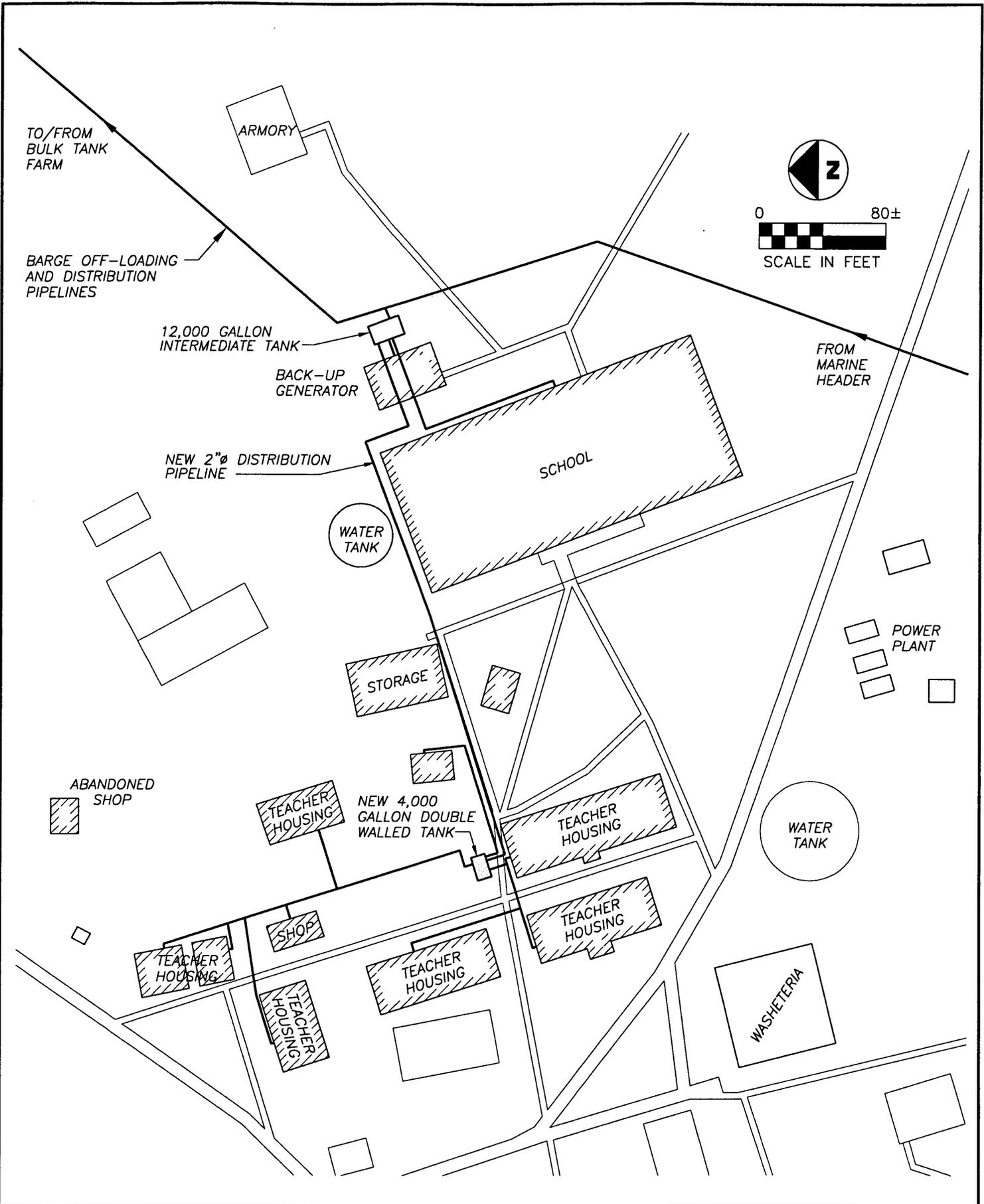
**ALTERNATE 2
 PROPOSED KONGIGANAK
 SCHOOL FUEL SYSTEM UPGRADE**

KONIGIGANAK, ALASKA

DATE: 9/27/02	DRAWN BY: CR/KK	SHEET: 3 OF 4
SCALE: AS SHOWN	CHECKED BY: WWW	W.O. No: 02-710

PLOTTING DATE: 10/01/02 (20:33)

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**ALTERNATE 3
 PROPOSED KONGIGANAK
 SCHOOL FUEL SYSTEM UPGRADE**

KONIGIGANAK, ALASKA

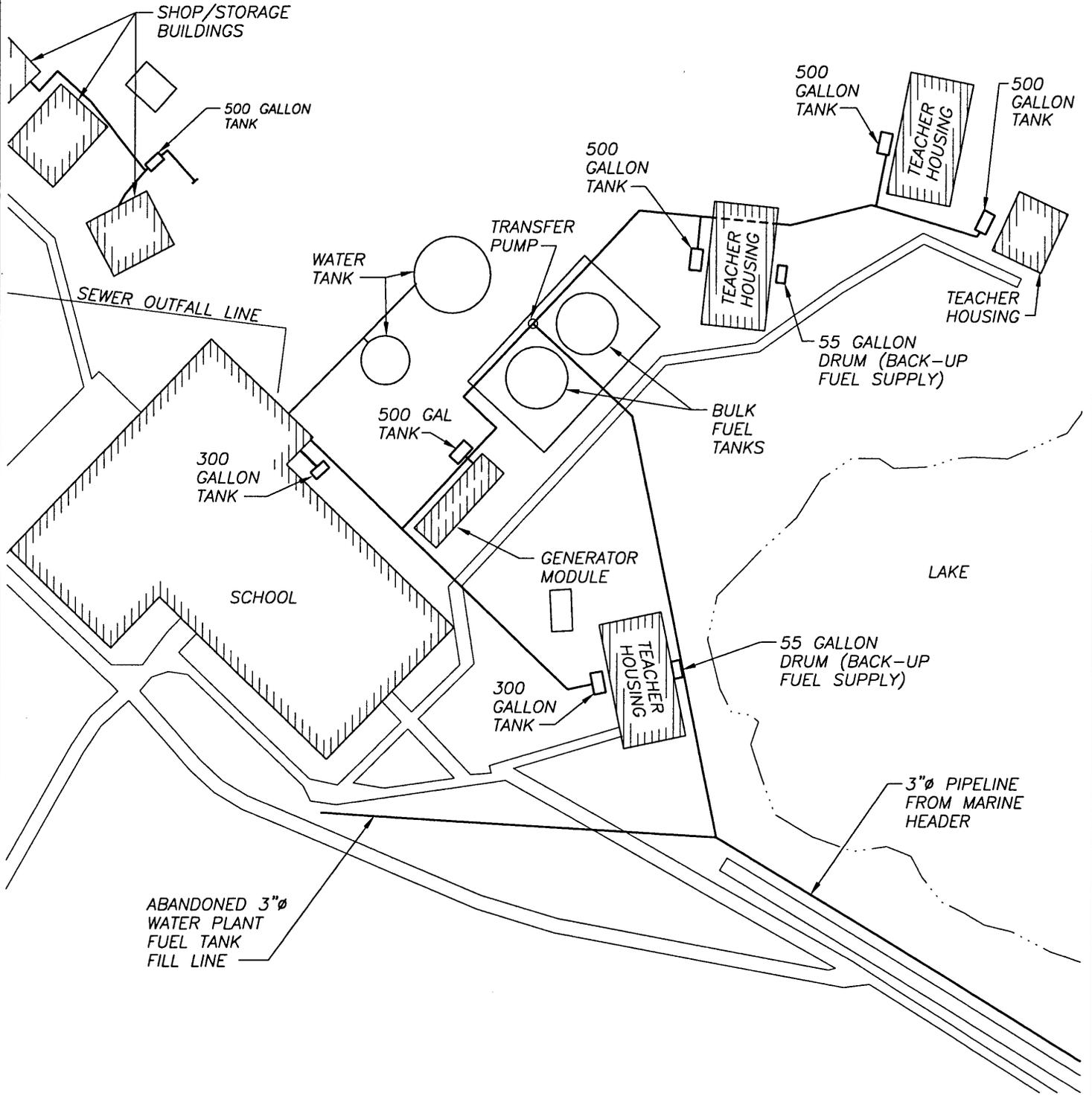
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PLOTTING DATE: 10/01/02 (17:37)

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**EXISTING
KWIGILLINGOK SCHOOL
FUEL SYSTEM
KWIGILLINGOK, ALASKA**

DATE: 10/01/02

DRAWN BY: CR/KK

SHEET: 1 OF 4

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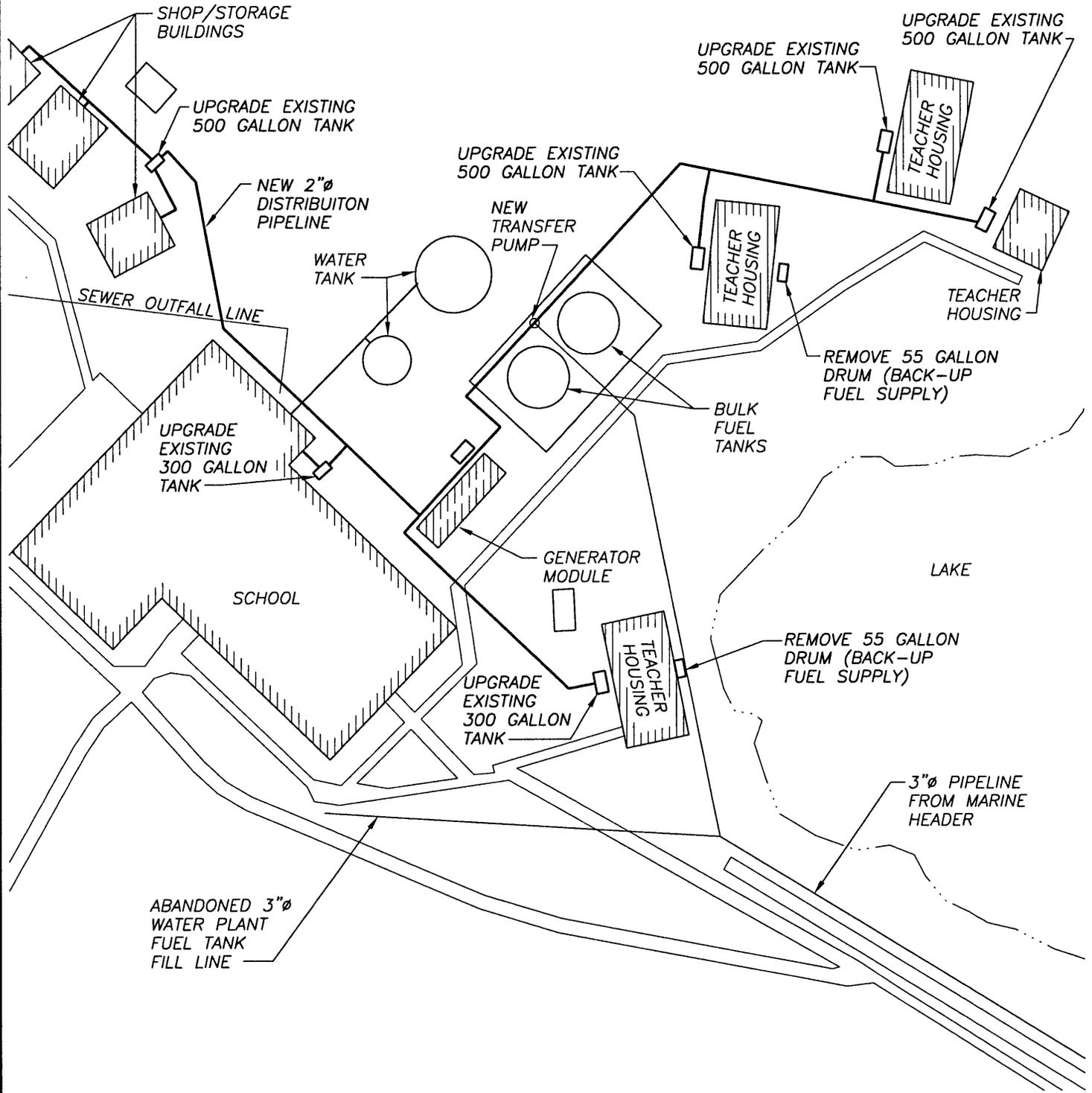
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**ALTERNATE No. 1
PROPOSED KWIGILLINGOK SCHOOL
FUEL SYSTEM UPGRADE
KWIGILLINGOK, ALASKA**

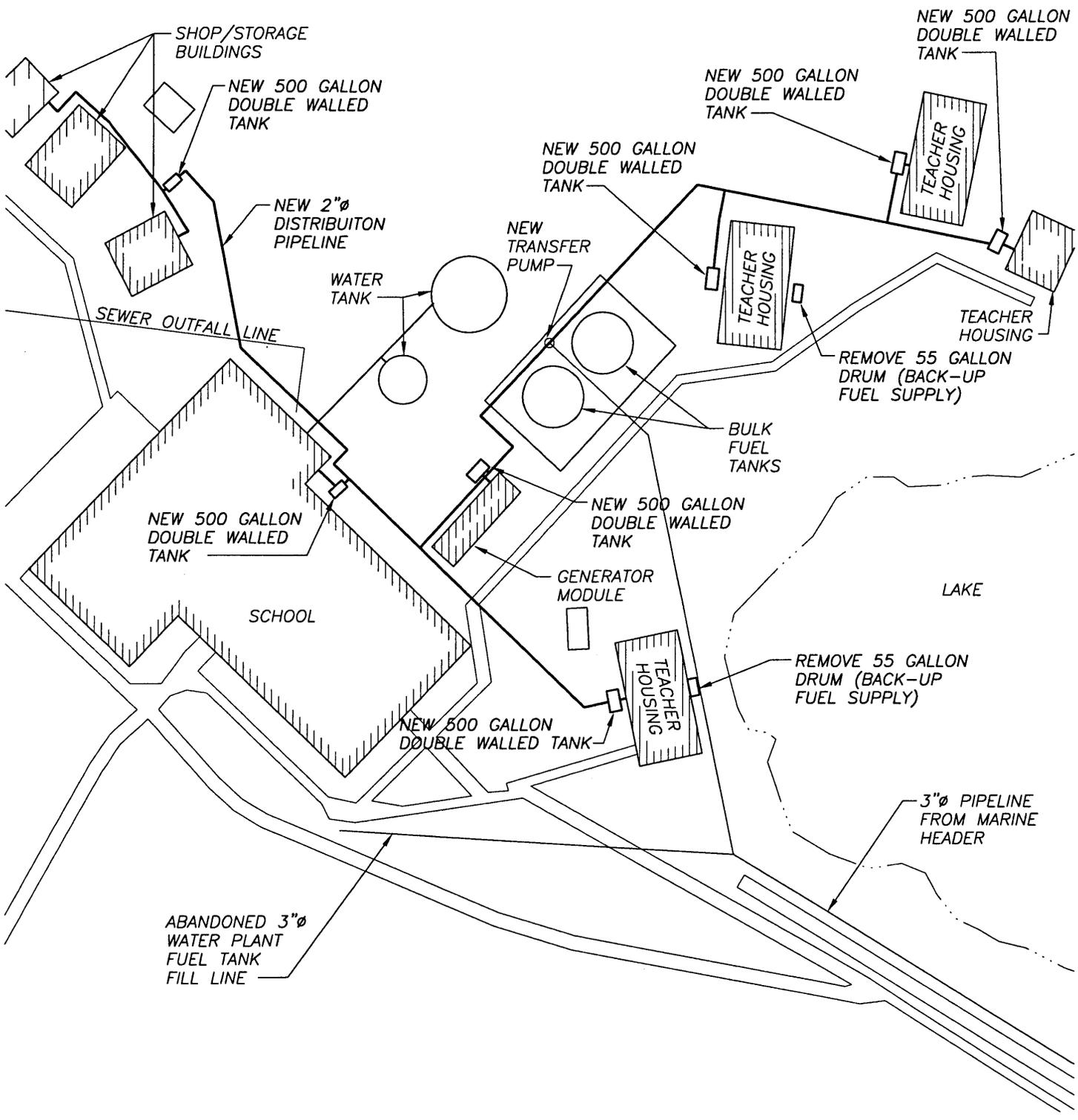
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SCALE: AS SHOWN	CHECKED BY: WWW	W.O. No: 02-710

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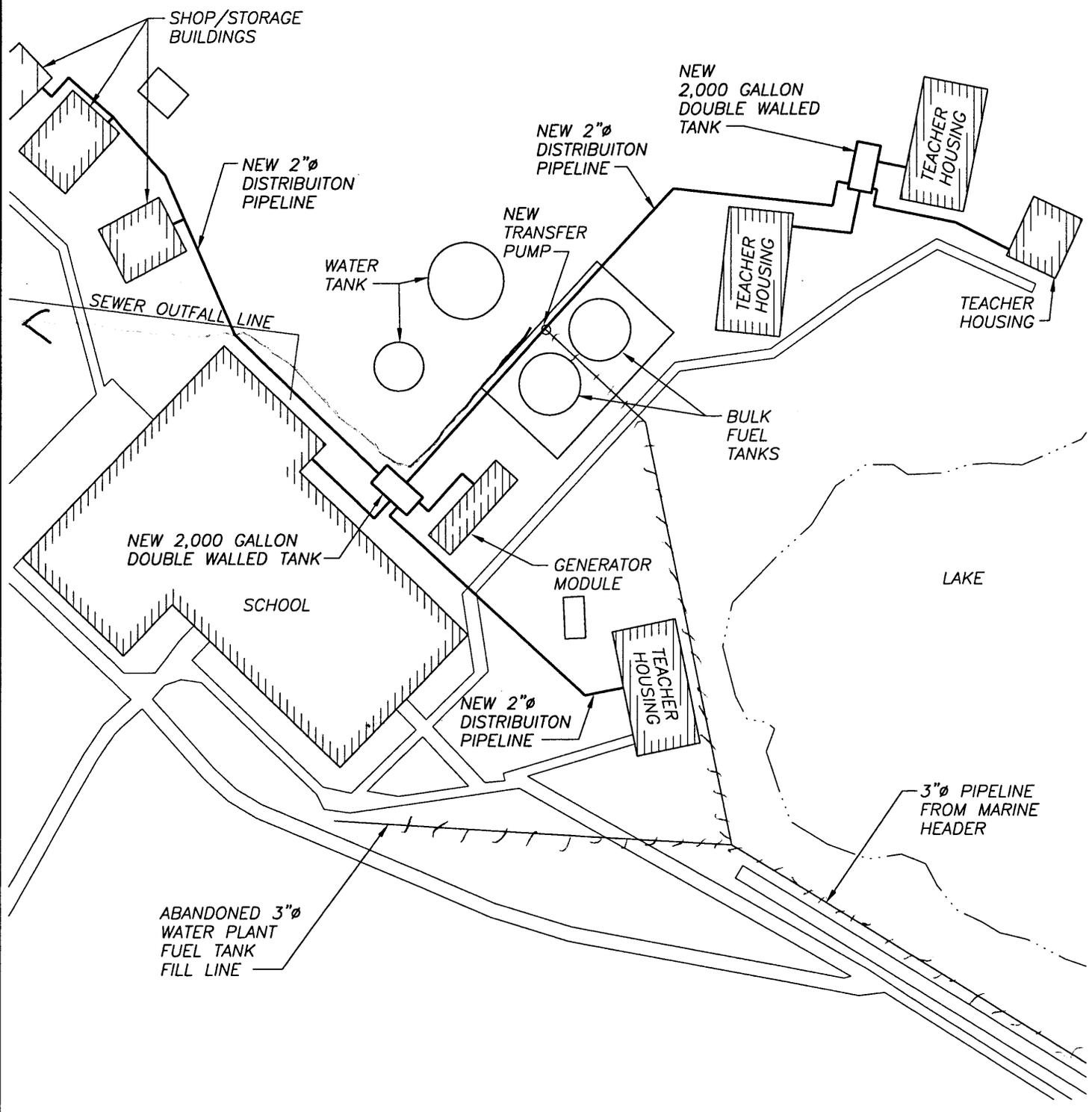


**ALTERNATE No. 2
PROPOSED KWIGILLINGOK SCHOOL
FUEL SYSTEM UPGRADE
KWIGILLINGOK, ALASKA**

DATE: 10/01/021	DRAWN BY: CR/KK	SHEET: 3 OF 4
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ALTERNATE No. 3
PROPOSED KWIGILLINGOK SCHOOL
FUEL SYSTEM UPGRADE
 KWIGILLINGOK, ALASKA

DATE: 10/01/02	DRAWN BY: CR/KK	SHEET: 4 OF 4
SCALE: AS SHOWN	CHECKED BY: WWW	W.O. No: 02-710

KONGIGANAK SCHOOL FUEL UPGRADE

PROJECT: Kongiganak School Fuel System Evaluation
PROJECT No.: 02-710
LEVEL: Conceptual
DATE: October 1, 2002
REFERENCE DRAWING(S): September 27, 2002
BASIS: Design/Build Construction
BY: TSH
FILE NAME: Kong Alternate 1 estimate.xls

COST COMPARISON

<u>Alternate 1 - Upgrade Existing Tanks</u>	<u>\$251,068</u>
<u>Alternate 2 - New 500 Gallon Double Wall Tanks</u>	<u>\$252,390</u>
<u>Alternate 3 - 4,000 Gallon Central Distribution Tank</u>	<u>\$394,750</u>
<u>Alternate 4 - New 500 Gallon Single Wall Tanks</u>	<u>\$224,256</u>

CONCEPTUAL COST ESTIMATE
Kongigank School Fuel Upgrade
Alternate 1

PROJECT: School Upgrade - Alternate 1

BY: TSH

PROJECT No.: 02-710

FILE NAME: Kong Alternate 1 estimate.xls

LEVEL: Conceptual

DATE: October 1, 2002

REFERENCE DRAWING(S): September 27, 2002

BASIS: Design/Build Construction

FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration	30	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor **68,700**

1 Project Manager		MD's		7.5	760	5,700			5,700
2 Foreman		MD's		30	650	19,500			19,500
3 Carpenters/Welders		MD's		30	550	16,500			16,500
4 Local Labor		MD's		60	450	27,000			27,000

Miscellaneous **88,994**

5 Mob/DeMob	1	SUM	15,000	15,000					15,000
6 Crew Per Diem	67	MD's	42	2,814					2,814
7 Crew Housing	67	MD's	30	2,010					2,010
8 Skid Steer Rental	1	MO	3,500				3,500	7,000	10,500
9 Welder Rental	1	MO	4,000				4,000	1,750	5,750
10 Four Wheeler Rental	1	MO	1,500				1,500	420	1,920
11 Fuel	1	SUM					3,000		3,000
12 Tool Rental	1	MO	10,000				10,000	28,000	38,000
13 Consumables	1	SUM	5,000	5,000				5,000	10,000

Tank Upgrades and Containmentment **28,893**

14 Tank Retrofit	7	EA	2,000	14,000				87.5	14,088
15 300 Gallon Tank Basin	9	EA	275	2,475				2,430	4,905
16 Tank Stand	9	SUM	300	2,700				2,250	4,950
17 New 300 Gallon Tank	2	EA	2,200	4,400				550	4,950

CONCEPTUAL COST ESTIMATE

Kongigiank School Fuel Upgrade

Alternate 1

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL	OR EQUIP RENT		

**(See Note Below)

Distribution Piping											14,587
18 2" Distribution Piping	1,060	LF	6.00	6,360					2,661		9,021
19 2" Ball Valve	9	EA	250	2,250					77		2,327
20 2" Flex Fittings	9	EA	80	720					45		765
21 Timber Pipe Supports	110	EA	15	1,650					825		2,475

Tank Farm Electrical											8,050
22 Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850		1,200		8,050

Sub-Totals:				62,379			72,550	22,000	52,295		209,224
								Contingency @	20%		41,845
								Construction Total:			251,068

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.

CONCEPTUAL COST ESTIMATE
Kongigiank School Fuel Upgrade
Alternate 2

PROJECT: School Upgrade - Alternate 2
PROJECT No.: 02-710
LEVEL: Conceptual
DATE: October 1, 2002
REFERENCE DRAWING(S): September 27, 2002
BASIS: Design/Build Construction
FREIGHT RATE: \$0.50/lb

BY: TSH
FILE NAME: Kong Alternate 1 estimate.xls

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL	OR EQUIP RENT		

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration	21	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor										48,090
1 Project Manager		MD's			5.25	760	3,990			3,990
2 Foreman		MD's			21	650	13,650			13,650
3 Carpenters/Welders		MD's			21	550	11,550			11,550
4 Local Labor		MD's			42	450	18,900			18,900
Miscellaneous										81,998
5 Mob/DeMob	1	SUM	15,000	15,000						15,000
6 Crew Per Diem	49	MD's	42	2,058						2,058
7 Crew Housing	49	MD's	30	1,470						1,470
8 Skid Steer Rental	0.7	MO	3,500					2,450	7,000	9,450
9 Welder Rental	0.7	MO	4,000					2,800	1,750	4,550
10 Four Wheeler Rental	0.7	MO	1,500					1,050	420	1,470
11 Fuel	1	SUM						3,000		3,000
12 Tool Rental	0.7	MO	10,000					7,000	28,000	35,000
13 Consumables	1	SUM	5,000	5,000					5,000	10,000
Tanks										57,600
14 Tank Stand	9	SUM	500	4,500					3,150	7,650
15 New 500 Gallon Tank	9	EA	4,800	43,200					6,750	49,950

CONCEPTUAL COST ESTIMATE
Kongigiank School Fuel Upgrade
Alternate 2

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

Distribution Piping										14,587
16 2" Distribution Piping	1,060	LF	6.00	6,360					2,661	9,021
17 2" Ball Valve	9	EA	250	2,250					77	2,327
18 2" Flex Fittings	9	EA	80	720					45	765
19 Timber Pipe Supports	110	EA	15	1,650					825	2,475
Tank Farm Electrical										8,050
20 Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850		1,200	8,050

Sub-Totals:	85,208			51,940	16,300	56,877	210,325
					Contingency @ 20%		42,065
					Construction Total:		252,390

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.

CONCEPTUAL COST ESTIMATE
Kongigiank School Fuel Upgrade
Alternate 3

PROJECT: School Upgrade - Alternate 3

BY: TSH

PROJECT No.: 02-710

FILE NAME: Kong Alternate 1 estimate.xls

LEVEL: Conceptual

DATE: October 1, 2002

REFERENCE DRAWING(S): September 27, 2002

BASIS: Design/Build Construction

FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

DISTRIBUTION UPGRADE

Estimated Project Duration	21	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor							48,090
1 Project Manager		MD's	5.25	760	3,990		3,990
2 Foreman		MD's	21	650	13,650		13,650
3 Carpenters/Welders		MD's	21	550	11,550		11,550
4 Local Labor		MD's	42	450	18,900		18,900

Miscellaneous							221,994
5 Mob/DeMob	1	SUM	15,000	15,000			15,000
6 Crew Per Diem	42	MD's	42	1,764			1,764
7 Crew Housing	42	MD's	30	1,260			1,260
8 Loader Rental *	3	MO	8,500			25,500	28,000
9 Crane Rental *	3	MO	15,000			45,000	42,000
10 Skid Steer Rental	0.7	MO	3,500			2,450	7,000
11 Welder Rental	0.7	MO	4,000			2,800	1,750
12 Four Wheeler Rental	0.7	MO	1,500			1,050	420
13 Fuel	1	SUM				3,000	
14 Tool Rental	0.7	MO	10,000			7,000	28,000
15 Consumables	1	SUM	5,000	5,000			5,000

Tank Upgrades and Containment							33,340
16 Tank Foundation	1	SUM	7,500	7,500			6,840
17 New 4,000 Gallon Tank **	1	EA	11,000	11,000			8,000

CONCEPTUAL COST ESTIMATE
Kongigiank School Fuel Upgrade
Alternate 4

PROJECT: School Upgrade - Alternate 4
PROJECT No.: 02-710
LEVEL: Conceptual
DATE: October 1, 2002

BY: TSH
FILE NAME: Kong Alternate 4 estimate.xls

REFERENCE DRAWING(S):
BASIS: Design/Build Construction
FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration 21 DAYS
Project Manager 1 EA
Foreman 1 EA
Welders 1 EA
Local Labor 2 EA

Labor 48,090

1 Project Manager		MD's		5.25	760	3,990				3,990
2 Foreman		MD's		21	650	13,650				13,650
3 Carpenters/Welders		MD's		21	550	11,550				11,550
4 Local Labor		MD's		42	450	18,900				18,900

Miscellaneous 81,998

5 Mob/DeMob	1	SUM	15,000		15,000					15,000
6 Crew Per Diem	49	MD's	42		2,058					2,058
7 Crew Housing	49	MD's	30		1,470					1,470
8 Skid Steer Rental	0.7	MO	3,500				2,450	7,000		9,450
9 Welder Rental	0.7	MO	4,000				2,800	1,750		4,550
10 Four Wheeler Rental	0.7	MO	1,500				1,050	420		1,470
11 Fuel	1	SUM					3,000			3,000
12 Tool Rental	0.7	MO	10,000				7,000	28,000		35,000
13 Consumables	1	SUM	5,000		5,000			5,000		10,000

Tank Upgrades and Containment 34,155

14 500 Gallon Tank Basin	9	EA	350		3,150			2,880		6,030
15 Tank Stand	9	SUM	300		2,700			2,250		4,950
16 New 500 Gallon Tank	9	EA	2,300		20,700			2,475		23,175

CONCEPTUAL COST ESTIMATE
Kongigiank School Fuel Upgrade
Alternate 4

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

Distribution Piping										14,587	
17	2" Distribution Piping	1,060	LF	6.00	6,360				2,661	9,021	
18	2" Ball Valve	9	EA	250	2,250				77	2,327	
19	2" Flex Fittings	9	EA	80	720				45	765	
20	Timber Pipe Supports	110	EA	15	1,650				825	2,475	
Tank Farm Electrical										8,050	
21	Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850	1,200	8,050	
Sub-Totals:				64,058				51,940	16,300	54,582	186,880
									Contingency @ 20%	37,376	
Construction Total:										224,256	

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.

KWIGILLINGOK SCHOOL FUEL UPGRADE

PROJECT: Kwigillingok School Fuel System Evaluation
PROJECT No.: 02-710
LEVEL: Conceptual
DATE: October 1, 2002
REFERENCE DRAWING(S): October 1, 2002
BASIS: Design/Build Construction
BY: TSH
FILE NAME: Kwig Alternate 1 estimate.xls

COST COMPARISON

<u>Alternate 1 - Upgrade Existing Tanks</u>	<u>\$240,683</u>
<u>Alternate 2 - New 500 Gallon Double Wall Tanks</u>	<u>\$235,276</u>
<u>Alternate 3 - 4,000 Gallon Central Distribution Tank</u>	<u>\$402,747</u>
<u>Alternate 4 - New 500 Gallon Single Wall Tanks</u>	<u>\$211,669</u>

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 1

PROJECT: School Upgrade - Alternate 1
PROJECT No.: 02-710
LEVEL: Conceptual
DATE: October 1, 2002
REFERENCE DRAWING(S): October 1, 2002
BASIS: Design/Build Construction
FREIGHT RATE: \$0.50/lb

BY: TSH
FILE NAME: Kwig Alternate 1 estimate.xls

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL	OR EQUIP RENT		

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration	30	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor							68,700
1 Project Manager		MD's	7.5	760	5,700	5,700	
2 Foreman		MD's	30	650	19,500	19,500	
3 Carpenters/Welders		MD's	30	550	16,500	16,500	
4 Local Labor		MD's	60	450	27,000	27,000	

Miscellaneous							88,994
5 Mob/DeMob	1	SUM	15,000	15,000		15,000	
6 Crew Per Diem	67	MD's	42	2,814		2,814	
7 Crew Housing	67	MD's	30	2,010		2,010	
8 Skid Steer Rental	1	MO	3,500		3,500	7,000	
9 Welder Rental	1	MO	4,000		4,000	1,750	
10 Four Wheeler Rental	1	MO	1,500		1,500	420	
11 Fuel	1	SUM			3,000	3,000	
12 Tool Rental	1	MO	10,000		10,000	28,000	
13 Consumables	1	SUM	5,000	5,000		5,000	

Tank Upgrades and Containment							22,378
14 Tank Retrofit	7	EA	2,000	14,000		88	
15 300 Gallon Tank Basin	2	EA	275	550		540	
16 500 Gallon Tank Basin	5	EA	350	1,750		1,600	
17 Tank Stand	7	SUM	300	2,100		1,750	

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 1

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL	OR EQUIP RENT		

**(See Note Below)

Distribution Piping										12,448	
18	2" Distribution Piping	800	LF	6.00	4,800					2,008	6,808
19	2" Ball Valve	7	EA	250	1,750					60	1,810
20	2" Flex Fittings	7	EA	80	560					35	595
21	2" Transfer Pump	1	EA	1,400	1,400					35	1,435
22	Timber Pipe Supports	80	EA	15	1,200					600	1,800
Tank Farm Electrical										8,050	
23	Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850		1,200	8,050
Sub-Totals:				55,934				72,550	22,000	50,085	200,569
										Contingency @ 20%	40,114
Construction Total:										240,683	

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.

CONCEPTUAL COST ESTIMATE

**Kwigillingok
School Fuel Upgrade**

PROJECT: School Upgrade - Alternate ~~2~~ **Alternate 2**

BY: TSH

PROJECT No.: 02-710

FILE NAME: Kwig Alternate 1 estimate.xls

LEVEL: Conceptual

DATE: October 1, 2002

REFERENCE DRAWING(S): October 1, 2002

BASIS: Design/Build Construction

FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration	21	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor							48,090
1 Project Manager		MD's		5.25	760	3,990	3,990
2 Foreman		MD's		21	650	13,650	13,650
3 Carpenters/Welders		MD's		21	550	11,550	11,550
4 Local Labor		MD's		42	450	18,900	18,900

Miscellaneous							81,998
5 Mob/DeMob	1	SUM	15,000				15,000
6 Crew Per Diem	49	MD's	42		2,058		2,058
7 Crew Housing	49	MD's	30		1,470		1,470
8 Skid Steer Rental	0.7	MO	3,500			2,450	7,000
9 Welder Rental	0.7	MO	4,000			2,800	1,750
10 Four Wheeler Rental	0.7	MO	1,500			1,050	420
11 Fuel	1	SUM				3,000	3,000
12 Tool Rental	0.7	MO	10,000			7,000	28,000
13 Consumables	1	SUM	5,000	5,000			5,000

Tanks							44,800
14 Tank Stand	7	SUM	500	3,500			2,450
15 New 500 Gallon Tank	7	EA	4,800	33,600			5,250

CONCEPTUAL COST ESTIMATE

Kwigillingok

School Fuel Upgrade

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

Distribution Piping										13,125
16	2" Distribution Piping	800	LF	6.00	4,800				2,008	6,808
17	2" Ball Valve	7	EA	250	1,750				60	1,810
18	2" Flex Fittings	7	EA	80	560				35	595
19	2" Transfer Pump	1	EA	1,400	1,400				38	1,438
20	Timber Pipe Supports	110	EA	15	1,650				825	2,475

Tank Farm Electrical										8,050
21	Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850	1,200	8,050

Sub-Totals:				73,788			51,940	16,300	54,035	196,063
Contingency @ 20%									39,213	
Construction Total:										235,276

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 3

PROJECT: School Upgrade - Alternate 3
 PROJECT No.: 02-710

BY: TSH
 FILE NAME: Kong Alternate 1 estimate.xls

LEVEL: Conceptual
 DATE: October 1, 2002

REFERENCE DRAWING(S): October 1, 2002
 BASIS: Design/Build Construction
 FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

DISTRIBUTION UPGRADE

Estimated Project Duration	21	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor										48,090
1 Project Manager		MD's		5.25	760	3,990				3,990
2 Foreman		MD's		21	650	13,650				13,650
3 Carpenters/Welders		MD's		21	550	11,550				11,550
4 Local Labor		MD's		42	450	18,900				18,900

Miscellaneous											221,994
5 Mob/DeMob	1	SUM	15,000		15,000						15,000
6 Crew Per Diem	42	MD's	42		1,764						1,764
7 Crew Housing	42	MD's	30		1,260						1,260
8 Loader Rental *	3	MO	8,500				25,500	28,000			53,500
9 Crane Rental *	3	MO	15,000				45,000	42,000			87,000
10 Skid Steer Rental	0.7	MO	3,500				2,450	7,000			9,450
11 Welder Rental	0.7	MO	4,000				2,800	1,750			4,550
12 Four Wheeler Rental	0.7	MO	1,500				1,050	420			1,470
13 Fuel	1	SUM					3,000				3,000
14 Tool Rental	0.7	MO	10,000				7,000	28,000			35,000
15 Consumables	1	SUM	5,000		5,000				5,000		10,000

Tank Upgrades and Containment											44,680
16 Tank Foundation	2	SUM	7,500		15,000				13,680		28,680
17 New 2,000 Gallon Tank **	2	EA	6,000		12,000				4,000		16,000

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 3

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			
Distribution Piping											11,809
	18 2" Distribution Piping	900	LF	6.00	5,400					2,259	7,659
	19 2" Ball Valve	2	EA	250	500					17	517
	20 2" Flex Fittings	2	EA	80	160					10	170
	21 2" Transfer Pump	1	EA	1,400	1,400					38	1,438
	22 Timber Pipe Supports	90	EA	15	1,350					675	2,025
Tank Farm Electrical											9,050
	23 Tank Monitor Power	1	SUM	4,000	4,000	7	550	3,850		1,200	9,050
Sub-Totals:				62,834				51,940	86,800	134,049	335,623
										Contingency @ 20%	<u>67,125</u>
											Construction Total: 402,747

BASIS FOR BUDGET COST ESTIMATE

- 1 * CRANE AND LOADER FREIGHT COST CALCULATED AT \$0.35/LB EACH WAY.
- 2 ** TANK FREIGHT IS ESTIMATED AT \$1.00 PER GALLON.

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 4

PROJECT: School Upgrade - Alternate 4

BY: TSH

PROJECT No.: 02-710

FILE NAME: Kwig Alternate 4 estimate.xls

LEVEL: Conceptual

DATE: October 1, 2002

REFERENCE DRAWING(S):

BASIS: Design/Build Construction

FREIGHT RATE: \$0.50/lb

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

DISTRIBUTION UPGRADE

Estimated Project Duration	21	DAYS
Project Manager	1	EA
Foreman	1	EA
Welders	1	EA
Local Labor	2	EA

Labor							48,090
1 Project Manager		MD's	5.25	760	3,990		3,990
2 Foreman		MD's	21	650	13,650		13,650
3 Carpenters/Welders		MD's	21	550	11,550		11,550
4 Local Labor		MD's	42	450	18,900		18,900

Miscellaneous							81,998
5 Mob/DeMob	1	SUM	15,000	15,000			15,000
6 Crew Per Diem	49	MD's	42	2,058			2,058
7 Crew Housing	49	MD's	30	1,470			1,470
8 Skid Steer Rental	0.7	MO	3,500			2,450	7,000
9 Welder Rental	0.7	MO	4,000			2,800	1,750
10 Four Wheeler Rental	0.7	MO	1,500			1,050	420
11 Fuel	1	SUM				3,000	
12 Tool Rental	0.7	MO	10,000			7,000	28,000
13 Consumables	1	SUM	5,000	5,000			5,000

Tank Upgrades and Containment							26,565
14 500 Gallon Tank Basin	7	EA	350	2,450			2,240
15 Tank Stand	7	SUM	300	2,100			1,750
16 New 500 Gallon Tank	7	EA	2,300	16,100			1,925

CONCEPTUAL COST ESTIMATE
Kwigillingok School Fuel Upgrade
Alternate 4

No.	ITEM	QTY	UNITS	MATERIAL		LABOR			OTHER OR EQUIP RENT	FREIGHT	TOTAL
				UNIT COST	MATL TOTAL	MAN DAYS	UNIT COST ***	LABOR TOTAL			

**(See Note Below)

Distribution Piping										11,688
17	2" Distribution Piping	800	LF	6.00	4,800				2,008	6,808
18	2" Ball Valve	7	EA	250	1,750				60	1,810
19	2" Flex Fittings	7	EA	80	560				35	595
20	Timber Pipe Supports	110	EA	15	1,650				825	2,475
Tank Farm Electrical										8,050
21	Tank Monitor Power	1	SUM	3,000	3,000	7	550	3,850	1,200	8,050

Sub-Totals:	55,938			51,940	16,300	52,213	176,391
					Contingency @ 20%		35,278
					Construction Total:		211,669

BASIS FOR BUDGET COST ESTIMATE

1 ** EQUIPMENT FREIGHT COST CALCULATED AT \$0.50/LB EACH WAY.