

Village Safe Water

*Alaska Department of Environmental Conservation
Division of Water - Facility Construction & Operation
555 Cordova Street; Anchorage, AK 99501
(907) 269-7502 ph; (907) 269-7509 fax*

Memorandum

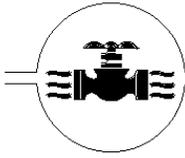
To: Shaktoolik trip report recipients

From: David Longtin, P.E., VSW Engineer I

Date: August 10, 2012

Re: water treatment process discussed in July 30-31 trip report

Ellen Williams of the Drinking Water Program talked to alternate water treatment plant operator Vernon Rock about the WTP process after receiving the subject trip report. Vernon indicated that the plant was actually NOT bypassing the pressure filters as I understand he told me on the trip, and that raw water WAS being properly treated prior to storage. Ellen recommended to Vernon that he disconnect and store the bypass hose so that future plant inspections don't give the impression that the Shaktoolik plant is distributing untreated water to its customers.



Village Safe Water Trip Report
Alaska Department of Environmental Conservation
Division of Water - Facility Construction & Operation
555 Cordova Street; Anchorage, AK 99501
(907) 269-7606 ph; (907) 269-7509 fax

REPORT DATE: August 9, 2012

REPORTER: David Longtin, PE
VSW Engineer

TRIP DATES: July 30-31, 2012

LOCATION: Shaktoolik

PROJECT NOS: 49495 & 49115

PURPOSE

Present draft Sanitation Facilities Master Plan to the City Council

CONTACTS

Eugene Asicksik, mayor, City of Shaktoolik (City)
Agnes Takak, secretary-treasurer, City Council
Edna Savetilik, member, City Council
George Sookiayak, member, City Council
Vernon Rock, treatment plant operator, City

ACCOMPANIED BY

Kyle Petersen, PE, Bristol Engineering Services Corporation (Bristol)
Mark Spafford, PE, Denali Commission

ACCOMPLISHMENTS/FINDINGS

Bristol had completed a draft Sanitation Facilities Master Plan in June 2011, but the budget did not allow the report to be presented to the community. I secured some supplemental funding to allow Kyle Petersen to accompany me to Shaktoolik to explain the document to the City Council and to solicit feedback. The feedback will be incorporated into a final version of the document.

Also present on the trip was Mark Spafford of the Denali Commission. Mark is heading up a multi-agency project to repair insulation on the water storage tank (WST) that had been damaged in a storm event. VSW is one of the funding partners for the WST project, and Mark was there to present that project to the council and to introduce me to the community.

The three of us arrived on separate flights just before noon. Water treatment plant (WTP) operator Vernon Rock gave me a tour of the facility. Here are my observations:

- The boilers are not where they are shown to be on QUADRA Engineering's 1980 as-builts. They are in the northeast corner of the building, not at the main WTP entrance on the north side of the building. The relocated boilers are not in themselves that significant, but VSW should consider re-as-building the whole plant as part of the WTP improvements project.
- A flexible hose was set up to allow raw water to bypass the pressure filters and enter the WST untreated. The chlorine injection was on the heat-add line to the WST, which appeared to be operating. It does not look like the water would be receiving any chlorine unless the heat-add loop was on. Vernon told me the filters were being bypassed because they were clogged.
- The washeteria was in a state of relative disrepair. Neither of the toilets was working (although the women's room toilet had been fixed by the time I left Shaktoolik). At least one of the four washing machines and at least one of the three dryers were not working.

- The WTP/washeteria was being utilized as a heated storage building for other projects.

Mayor Eugene Asicksik was at the city office when I returned from the WTP. We decided to schedule a council meeting for 2 p.m. Eugene asked the admin staff to schedule the meeting while he took Mark, Kyle and me on a driving tour of the town. Here are my observations:

- The thin strip of land separating Norton Sound from the water-supplying Tagoomenik River is in serious danger of being breached. The City is considering moving locally available gravel to spots especially vulnerable of being overtopped by storm waves.
- The raw water line from the summer intake really should be protected. It currently snakes across private property and sports several nicks from snowmobile traffic. The draft feasibility report developed alternatives to fix this problem, but the grant funding is insufficient to address it.
- Remote Maintenance Worker Chuck Simon and former VSW Engineer Phil Gagnon modified the winter intake. These changes should be as-built and the O&M manual should be updated to reflect the change.
- Discharge from the WTP's filter backwash is directly to the ground surface west of the plant. This does not meet wastewater disposal regulations.

The council meeting started promptly at 2. Eugene introduced the visitors to the City Council, presented the agenda and talked about some of the recent issues the City was dealing with. After that, the visitors took turns presenting various topics to the council. The presentations are summarized below.

Longtin

I listed the current and anticipated grants available to the City for sanitation improvements. The grants were summarized on a handout (Attachment 1). I indicated that the scope of 09AL48 is flexible, and that I'll wait for the sanitation master plan to be finalized before "locking in" the scope and passing along the grant offer to the community. After the meeting, I collected the required signatures on Grants 05EH02 (first amendment for WST repairs) and 12AN03. These grants have since been added to the state accounting system and are available for paying invoices.

I had hoped to present the draft business plan to the council, but I did not have a chance to read it before the meeting, and asked that this agenda item be tabled. I told Eugene I'd read the business plan after the meeting, and discuss it with him personally.

Petersen

Kyle discussed the master plan, which he had summarized on a handout (Attachment 2). His coverage was comprehensive, but did not elicit many questions or comments from the council. We will have to re-engage the council after the projects recommended by the master plan are re-prioritized, so that the council's acceptance of the master plan correctly identifies their priorities.

Spafford

Mark described to the council the complicated funding arrangement for the WST insulation repair project. Funders include VSW, the Denali Commission, FEMA and the Norton Sound Economic Development Corporation. Eugene and Mark had already been deeply involved in funding activities, so he was very aware of the situation. A council member asked whether repairing the tank insulation might jeopardize the City's chances of receiving funding to replace the tank,

which the master plan identified as the top sanitation priority. I said that it would not. Mark also updated the council on the fabrication and shipping status of the tank insulation materials.

Kyle and I caught a flight back to Nome immediately after the meeting. Kyle flew back to Anchorage that night. I flew to Anchorage the following morning (July 31). Mark flew back from Shaktoolik on July 31. In my haste to catch the flight, I did not have the chance to discuss the draft business plan with Eugene.

Select photos are included in Attachment 3. Other photos are available on the network at
G:\Water\FACILITIES\Photo\Photo_Volume_1\VSW 2012\Shaktoolik\July 30-31

FOLLOW-UP (responsible party)

- During the council meeting, Eugene requested a copy of the most recently completed sanitary survey for the WTP; I told him I would provide one (Longtin)
- Also during the meeting, Eugene underscored the City's need of a new septage pumper; I told him I'd look into whether Grant 12AN03 or 09AL48 could fund this (Longtin)
- Discuss the draft business plan with Eugene (Longtin)

ATTACHMENTS

1. Longtin handout (1 page)
2. Petersen handout (6 pages)
3. Photo page (1 page)

CC:

Eugene Asicksik, City
Kyle Petersen, Bristol
Mark Spafford, Denali Commission
Leroy Seppilu, DCCED
VSW Distribution
Operations Assistance

SUMMARY OF VSW GRANTS FOR SANITATION IMPROVEMENTS AT SHAKTOOLIK

SOA grants	grant number		scope	status	financial data*		
	SOA finance	ANTHC			amount	expended	balance
10EN94	71683	NA	This Agreement provides for a study to identify and analyze the deficiencies of the existing water treatment plant and water storage tank along with recommendations. Includes business plan.	active	\$ 75,000.00	\$ 69,350.72	\$ 5,649.28
	49495	NA	Present study to community. Complete business plan.	active	\$ 9,200.00	\$ -	\$ 9,200.00
05EH02	71065	NA	This Agreement will finance repairs to the water storage tank. The tank has two failed columns and is in imminent danger of collapse. The first part of this project is to repair the structural damage in the tank. The second phase will re-coat the interior of the tank with an NSF 61 approved coating system.	active	\$ 322,000.00	\$ 307,593.48	\$ 14,406.52
	49115	NA	Amendment for Additional EMT.	offered	\$ 136,031.00 **	\$ -	\$ 136,031.00
	NA	NA	Amendment for WST insulation repairs.	pending	\$ 59,616.00 **	\$ -	\$ 59,616.00
12AN03	NA	AN-12-NT2	This Agreement provides funding for completion of the water treatment plant (WTP) improvements to meet surface water requirements. Improvements include structural repairs, water treatment pilot study, filtration upgrades, corrosion reduction, pump replacement and addition of a chlorination/chemical storage room.	offered	\$ 609,000.00 **	\$ -	\$ 609,000.00
	09AL48	NA	[Draft CPA] Renovate the WTP to include replacement of the electrical control hardware that was destroyed in their fire. Reduce organic carbon as a precursor to disinfection byproducts. In addition, the water treatment, storage and distribution process will be studied to determine if additional changes can be made to further increase the quality of water supplied to the community and to meet the requirements of the SWTR. Pilot testing and the review of treatment process and design drawings will be completed.	pending	\$ 283,000.00 **	\$ -	\$ 283,000.00

* Financial data for VSW-lead projects do not include funding, expenditures or balance information for EMT.

** This funding is not yet available.

WATER STORAGE

- Tank is likely to experience a complete failure sometime within next five years.
- New WST will be installed at the same location as current WST.
- Costs for repair versus replacement are very similar (repair 10% higher);
- The integrity of the existing steel plates are uncertain;
- Expected life of bolt-up tank is much greater than repairing current tank.
- Risks for recoating the interior of existing tank (temperature and humidity).
- WTP and WST may partially be located on land leased to the Bering Straits School District (through SNC).

Water Storage Tank Improvements

Option	Item	Capital Cost (\$)
1	WST Replacement	2,163,000
2	WST Repair	2,361,000

Winter Intake Salinity Reduction Alternatives

Alternative	Description
W1	Move winter intake upstream. Set main in the Tagoomenik River.
W2	Install control switch at the winter pump and conductivity monitor at WTP. Shut off pump automatically and automatic alarm if salinity is too high.
W3	Move winter intake upstream. Install insulated, circulating water pipe with electric heat trace.
W4	Increase water storage capacity.

Summer Water Intake

Alternative	Description
S1	Anchor summer main in the Tagoomenik River. Upgrade existing pumps.
S2	Move summer intake approximately one mile upriver from current location. Purchase new pumps. Install screen.
S3	Bury summer intake in ground along easement. Upgrade existing pumps.
S4	Install renewable energy system for pump operation.
S5	New summer pump / intake screen

Water Intake Alternatives Cost Estimate

Recommended?	Alternative	Description	Capital Cost (\$)	Annual O&M Cost (\$)	20-Year Present Worth Cost (\$)
No	W1	Anchor new raw water main in the Tagoomenik River	Not calculated		
Yes	W2	Upgrade winter intake pump house. Install control switch at winter pump and conductivity meter at WTP. Install automatic shutoff / alarm if conductivity is too high.	50,000	500	60,000
No	W3	Move winter intake upstream. Install insulated, circulating water pipe with heat trace.	2,700,000	50,000	3,700,000
No	W4	Increase water storage capacity.	13,500,000 ¹	250,000	18,500,000
Probably	S1	Anchor new summer raw water main in the Tagoomenik River.	902,500	-2,000	862,500
Yes, but only if Alt S1 is unfeasible	S2	Bury new summer raw water main. Upgrade pumps.	1,463,000	-2,000	1,423,000
Yes, upon further evaluation	S3	Install wind generator for summer intake.	140,000	-4,000	60,000
No	S4	Move summer intake one mile upriver. Upgrade pumps. Assumes pipe would be buried, and installed in conjunction with Alternative S2.	1,170,000	15,000	1,470,000
Yes	S5	Summer intake screen / new pump	20,000	-1,000	0

Water Intake Alternatives Cost Summary

Phase	Description	Capital Cost (\$)	Annual O&M Cost (\$)	20-Year Present Worth Cost (\$)
2.1	Upgrade winter intake pump house. Install control switch at the winter pump and conductivity meter at WTP. Install automatic shutoff / alarm if conductivity is too high.	50,000	500	60,000
2.2	Summer intake screen / new pump	20,000	-1,000	0
2.3a	Bury summer intake. Upgrade pumps.	1,463,000	-2,000	1,423,000
2.3b	Anchor summer intake in the Tagoomenik River.	902,500	-2,000	862,500
2.4	Install wind generator for summer intake.	140,000	-4,000	60,000
Total ¹		1,622,500	-7,000	1,482,500

Notes: ¹Does not include Phase 2.3b.

WATER TREATMENT PLANT

- Shaktoolik's raw water quality is generally very good, but the system has not met SWTR requirements, and has routinely exceeded minimum turbidity requirements.
- Upgrades to the WTP or water intake will be required for SWTR.
- Changes required for the water treatment process.
- Addition of coagulants.
- Control equipment.
- Jar testing.
- Filters need to be upgraded.
- Limited water quality data available. More testing required. Ultimate recommendation cannot be made for upgrading versus replacing the filtration system.
- Baffling for the WST, or separate CT tank may be required.
- Operator level may change
- Expired water rights permit.

WATER QUALITY

- Disinfection by-product (DBP) limits exceeded.
- High turbidity in the finished water.
- High copper from corrosion in the system.

Lead and Copper

- Copper testing results exceeded limits in 2000, 2001, and 2004.
- Testing required.
- Soda ash or polyphosphate.

Long-Term 1 and Long-Term 2 (LT1 and LT2) Enhanced Surface Water Treatment Rule

- Shaktoolik has not completed coliform testing to establish Bin classification.
- 24 months of sampling and testing twice per month.
- Likely fall into the Bin 1 classification, requiring minimal additional treatment.

Disinfection By-Products

- DBP not a problem during winter and early spring
- Problem in the mid to late fall months.
- More testing required.

Filtration

- Primary problem is saltwater intrusion.
- Filtration system needs to be upgraded
- Streaming current detector (SCD)
- SCADA system for monitoring
- More information required before treatment recommendations can be made.

Salt Water Intrusion

- Treatment not recommended.
- Automatic shutdown of the system when salt water reaches a specified level.

Fluoridation

- City does not fluoridate its water.
- No improvements recommended.

Pumps

- Replace existing WTP pumps

Water Treatment Plant Improvements [Phase 2.1]

Phase	Item	Capital Cost (\$)	Additional Yearly O&M Cost (\$)	20-Year Present Worth Cost (\$)
3.1	Roof replacement	75,000	0	75,000
3.2	Repair of exterior doorways/entrances	20,000	-1,000	0
3.3	Chlorination / chemical storage room	60,000	0	60,000
3.4	Water sampling (treatment evaluation)	4,000	0	4,000
3.5	WTP Pilot Study	15,000	0	15,000
3.6	Upgrade filtration system ¹	300,000	3,000	360,000
3.7	Corrosion reduction ¹	40,000	2,000	80,000
3.8	Ladder to the WST circulation pumps	2,000	0	2,000
3.9	Replace pressure pumps, backwash pumps, and distribution system circulation pumps	20,000	0	20,000
3.10	Replacement of washeteria washers and dryers	30,000	-500	20,000
3.11	Repair of sewer service to men's restroom	10,000	0	10,000
3.12	Fuel tank replacement	12,000	0	12,000
3.13	Paint WTP	20,000	0	20,000
Total		609,000	3,500	679,000

WTP Energy Efficiency Improvements

Phase	Description	Capital Cost (\$)	Annual O&M Cost (\$)	20-Year Present Worth Cost (\$)
4.1	Replace Existing WTP Windows ¹	35,000	-2,000	-5,000
Total		35,000	-2,000	-5,000
4.2	Reframe building / Replace siding	250,000	-4,000	120,000
4.3	WST Mixer	50,000	-5,000	-50,000

WATER DISTRIBUTION / WATER SERVICES

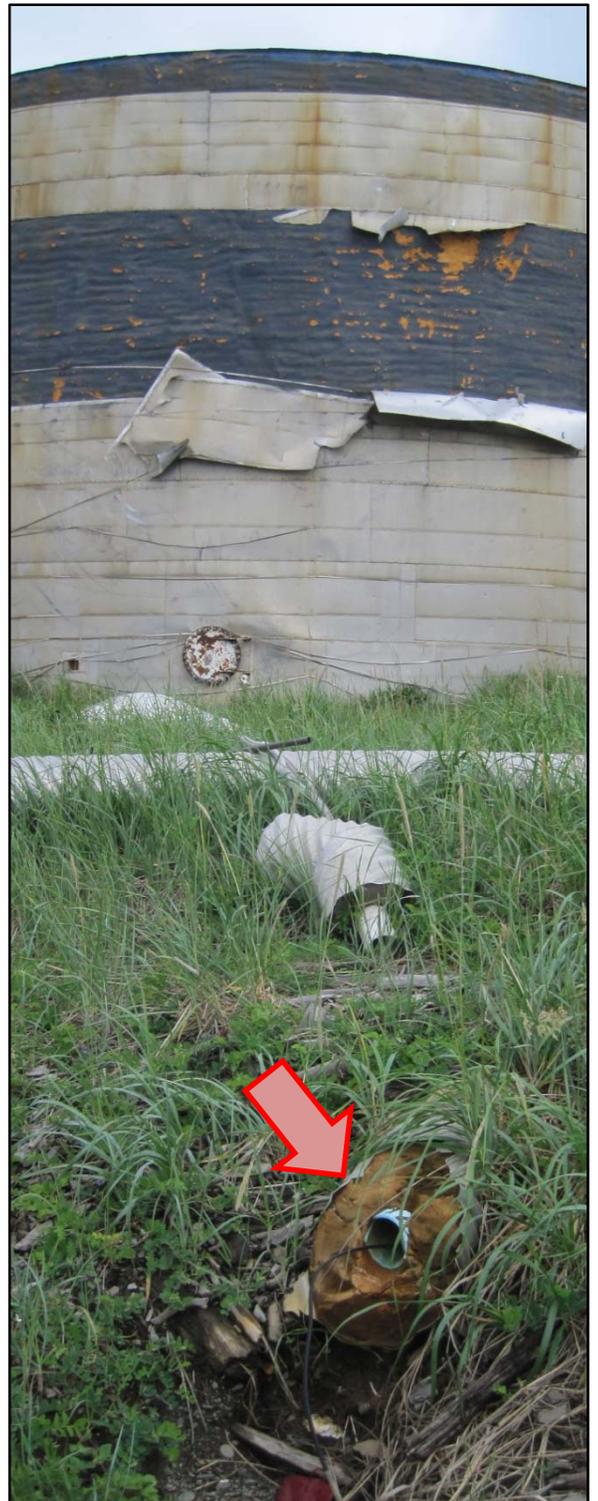
No major improvements are recommended for the water distribution system.

WASTEWATER

- New septage trailer
- Fencing at septage disposal site.

Proposed Sanitation Improvements

Phase	Recommended Improvement	Design / Construction Costs (\$)	Estimated Cost per Household (\$)
1.1	Water Storage Tank Replacement	2,163,000	34,300
2.1	Upgrade Winter Pump House	50,000	800
2.2	Summer/Winter Intake Screens	20,000	300
2.3	Replace Summer Raw Water Main	1,462,500	23,200
2.4	Summer Intake Wind Generator	140,000	2,200
3.1-3.12	Water Treatment Plant Improvements	609,000	9,700
4.1	Replace WTP Windows	35,000	600
5.1	New Septage Pumper Trailer	65,000	1,000
5.2	Septage Disposal Site Fencing	30,000	500
Total		4,575,000	73,000



Above, left: The pipes in the corridor between the WTP and the WST include a flexible hose that is bypassing the inoperable filters. **Above:** Filter backwash is discharged directly to the ground surface downhill of the damaged WST. **Left:** Snowmobile traffic has damaged the raw water transmission line from the summer intake.

DISTRIBUTION LIST

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