	Approved	Denied
Date Action Taken:	10/27/08	
Other:		
Verified by:	KSmith	

WASILLA CITY COUNCIL ACTION MEMORANDUM — AM No. 08-62

TITLE: **CONTRACT AMENDMENT TO USKH, INC. IN THE AMOUNT OF $30,000 FOR SEWAGE TREATMENT PLANT ENGINEERING SERVICES.**

Agenda of: October 27, 2008
Originator: Public Works Director

Date: October 15, 2008

Route to:	Department	Signature/Date
	Police Chief Youth Court, Dispatch, Code Compliance	
	Culture and Recreation Services Director Library, Museum, Sports Complex	
X	Public Works Director Facility Maintenance, Utility, Roads & Airport	[signature] 10·15·08
X	Chief Financial Officer Finance, Risk Management, Purchasing & MIS	[signature]
X	Deputy Administrator Planning, Economic Development, Human Resources	[signature]
X	City Clerk	[signature]

REVIEWED BY MAYOR DIANNE M. KELLER: Dianne M. Keller

FISCAL IMPACT: ☒ yes $30,000 *or* ☐ no Funds Available ☒ yes ☐ no
Account name/number: Sewage Treatment Plant Exp. /310-4359-435-45.15
Attachments: RFP Details and Engineering Summaries

SUMMARY STATEMENT: The original contract was awarded on June 26, 2006 by the City Council (AM 06-35) in the amount of $54,328 to close out an Alaska Department of Environmental Conservation grant. The original contract was advertised through a Request for Proposal on April 18, 2006, where USKH, Inc. was determined to be the most qualified firm for this project. Work continued in 2007 through a $30,000 change order authorized by the Mayor in accordance with WMC 5.08.090 with City funds for geotechnical work. Additional City funds were budgeted in 2008 to continue the engineering services through this contract amendment to further define the best option to upgrade the sewage treatment plant.

ACTION: Authorize the Mayor to execute contract amendment with USKH, Inc. in the amount of $30,000 for sewage treatment plant expansion engineering services.

Login | Register | Help

ONVIA DEMANDSTAR

LIVE EXPERT NEED HELP? CLICK TO CHAT.

Home My DemandStar Buyers Suppliers Account Info

Bid Details

Bid Information

Agency	City of Wasilla
Bid Type	Request for Proposal
Bid Number	RFP-0623-0-2006/WM
Fiscal Year	2006
Bid Writer	William Miller
Bid Name	Engineering Services for Sewer Treatment Plant Expansion
Bid Status	Awarded
Bid Status Text	NOTE: The initial budget for the engineering services is $54,328 and it is anticipated that additional funds may be come available for design and construction. Total construction budget is estimated to be $150,000.
Award To	USKH, Inc $54,328.00
Due Date/Time	5/26/2006 4:00 PM Alaska
Broadcast Date	4/18/2006
Bid Bond	
Project Estimated Budget	
Plan (blueprint) Distribution Options	None
Distribution Method	Download and Mail
Distributed By	Onvia DemandStar
Distribution Notes	None
Scope of Work	The City of Wasilla is soliciting proposals for engineering services for the construction of a new aerated lagoon and additional drain field at the City of Wasilla wastewater treatment plant. The improvements will increase the capacity of the plant from 600,000 to 1,000,000 gallons per day.
E-Bidding	No

Legal Ad

VIEW

Please select either the View or Edit button to manage legal ad.

Pre-Bid Conference

Publications

Anchorage Daily News 4/18/2006
The Frontiersman 4/18/2006

Documents

VIEW

Bid Package: **Sewer Treatment Plant Engineering Services RFP** (Complete)
Q&A (2 Pages, Complete)

Award Scoring Matrix (1 Page, Complete)
REVISED Scoring Matrix (1 Page, Complete)

Commodity Codes

SRV-925-87 - Sewage Collection, Treatment, and Disposal/Engineering

<< Return

NTL ALASKA, INC.
3536 INTERNATIONAL WAY, FAIRBANKS, AK 99701
(907) 452-6852 fax (907) 452-6853
www.ntlalaska.com

June 13, 2007

USKH
Attention: Dean Syta, PE
2515 A Street
Anchorage, Alaska 99503

Re: City of Wasilla Wastewater Treatment Plant (WWTP) Project: Memorandum of Wastewater Treatment Options

Dear Dean:

Per your request, NTL Alaska, Inc. (NTL) is providing this memorandum regarding wastewater treatment options for consideration by the City of Wasilla. Also, per your request, we are evaluating these options for a treatment capacity of 1 MGD (million gallons per day). Currently, the majority of the influent flow originates from a septic tank effluent pumping (STEP) system, which results in a lower influent total suspended solids (TSS) than would otherwise be typical of raw domestic wastewater.

As noted in our previous reports on this facility, the data available for this analysis is incomplete, including very little available TSS data and questionable biochemical oxygen demand (BOD) data dating from November 2004 when the City of Wasilla changed subcontract laboratories. Per your direction on May 3, 2007, we are using the following data for the influent loading for this analysis: 300 mg/L BOD and 100 mg/L TSS.

In the following discussion, we are presenting some options for consideration for expansion of the existing Wasilla WWTP. In each case the advantages and disadvantages, and associated significant constraints, are discussed. This discussion is derived from and builds upon the Wasilla Sewer Master Plan (GV Jones, 1999). The following options are presented in two sections, first as alternatives for upgrading the existing system, then as alternatives to replace the WWTP with a different technology.

Alternatives to upgrade the existing lagoon system: The master plan listed the following alternatives to modify the existing WWTP and disposal system. An influent preliminary treatment system was recommended to screen large solids and grit from the influent, particularly as future flows will include a lower percentage of STEP influent and a higher percentage of conventional sewage with more solids.

- **Aeration Upgrade** – installation of a new, higher-efficiency diffuser system to bring the lagoon system up to a rated capacity of 550,000 gpd. This option was selected and installed in 2001. Although this improved the mechanical reliability of the lagoon system, there was no change in effluent quality. Effluent disposal continues through the existing percolation beds and remains a significant limiting factor to the expansion of this facility.

- **EAAS (Extended Aeration Activated Sludge)** – a modification of conventional activated sludge that could utilize much of the existing lagoon infrastructure, with a hydraulic detention time of 1.5 to 2.0 days at average daily flow. EAAS requires a secondary clarifier, but should produce a higher quality effluent than the existing lagoon system. Problems with sludge settleability are common with EAAS systems. Also EAAS is not designed to achieve nitrogen removal and has reduced efficiency when exposed to cold weather.

  EAAS is one of the most widely used secondary WWT processes in Alaska, particularly package wastewater plants. This process has been adapted to single family residential treatment plants with hundreds of installed units in the Anchorage area alone. There are an estimated 100 installed larger package plants in oil and gas, fish processing, and mining work camps, remote government and military sites, and tourist facilities throughout Alaska, with capacities ranging from less than 2,000 gpd to more than 100,000 gpd.

  Nearly all EAAS package plants in Alaska are either directly buried in the ground (residential units) or enclosed in heated structures. One exception to this is the oxidation ditch EAAS process, which utilizes an oval aeration ditch and surface "brush" aerators that provide aeration and mixing of the activated sludge. There is currently one oxidation ditch WWTP in Adak that is located outdoors, and another, now decommissioned, that was operated successfully outdoors in Fairbanks by the College Utilities Corporation treating wastewater from UAF year round.

  The master plan proposed that the existing lagoon system be modified for the EAAS process and that the aeration system be operated outdoors. A new secondary clarifier would be required and effluent discharge would continue to the existing effluent percolation beds.

- **RGMF (Recirculating Granular Media Filtration)** – a fixed-film secondary biological system that uses a coarse granular media such as pea gravel or glass beads as a surface upon which biofilm grows. Nitrogen reductions from 20 – 60% have been achieved with RGMF systems, but they can suffer a loss of hydraulic capacity as the biological growth increases over time. Effluent disposal would continue to utilize the existing percolation beds.

- **Freeze/Sublimation** – essentially a snow-maker that utilizes the cold winter weather to freeze and sublimate effluent (evaporate from a solid directly to a gas). A significant land area is required to receive and store the frozen effluent, and to disperse the accumulated snow in the spring. This system would be used in conjunction with the existing percolation beds, allowing them a rest period of about 6 months per year. This type of system requires a large land area (over 50 acres per MGD).

- **Overland Irrigation** – during the summer, overland irrigation can be used for final effluent disposal. Uptake of nutrients by plants can reduce nitrogen and phosphorus levels in the final effluent, but the land area is considerable for complete effluent disposal: 60 – 560 acres per MGD. An adaptation of this technology, referred to as constructed wetlands, accomplishes effluent polishing and nutrient (nitrogen and phosphorus) removal in a much smaller area prior to discharge to the final receiving water. This has been applied successfully in several small communities in Alaska including Nulato and Talkeetna where seasonal discharges from facultative (non-aerated) lagoons are discharged during the summer months. In both of those applications, the entire flow is stored over the winter in large lagoon systems.

The master plan rated the aeration upgrade and the EAAS as the highest ranked of these alternatives, with the aerated lagoon upgrade as the lowest capital cost and the easiest to operate of these two. As noted above, the City of Wasilla selected the option to upgrade the aeration system in the existing lagoons from these alternatives. That aeration system is in operation today and is performing well with lower power use than the original air diffuser system it replaced.

The lagoon could be expanded to a capacity of approximately 1 MGD by approximately doubling the size of the existing system, but the hydraulic capacity and nitrate adsorption limitations of the percolation beds at this site continue to constrain this alternative. If a suitable receiving water location is available, a seasonal surface discharge through a constructed wetland for effluent polishing and nutrient removal might be a partial, relatively low-cost solution to allow for an annual resting period for the percolation beds.

Replacement technology alternatives: The master plan presented the first three of the following replacement technology options. The master plan did not include conventional activated sludge in the matrix of possible replacement alternatives for the Wasilla WWTP. Various adaptations of conventional activated sludge are used in a number of larger communities in Alaska such as the Juneau-Douglas WWTP, Soldotna, Kenai, Homer, and Fairbanks. The Fairbanks plant is rated for a capacity of 8 MGD, and employs a pure oxygen generation system for the aerobic process, which allows for a smaller footprint for that completely enclosed facility.

Conventional activated sludge can be modified for biological nutrient removal (BNR), but additional tanks are required and the operational complexity increases significantly. None of the municipal activated sludge plants in Alaska have been modified for BNR. One package activated sludge plant on the North Slope has been modified and successfully operates as a BNR process. That plant requires 24-hour per day, 7-day per week operator surveillance. The relatively high capital and operational costs of conventional activated sludge has spurred the development of a number of alternative technologies, several of which were compared in the master plan.

The most common effluent disinfection process used with conventional activated sludge is chlorination, although ultraviolet (UV) disinfection is growing in popularity. UV has the advantage of disinfecting without the use of chemicals such as chlorine. Also, wastewater disposal permits now usually require the removal of any residual chlorine prior to discharge, or at least at the end of any mixing zone allowed in the receiving water. The removal of chlorine (dechlorination) requires a second chemical process with chemical solution mixing, dosing, and monitoring systems. UV replaces that with a single pass of the effluent through a chamber illuminated with UV light. Regular cleaning and occasional bulb replacement are required, and electric power consumption is an added expense. The comparative cost of UV versus chlorination and dechlorination is now shifting toward UV as the lower cost option, particularly with increases in the cost of calcium or sodium hypochlorite. On site generation of chorine (sodium hypochlorite), which uses salt, water, and electricity, has become more common due to the higher cost of chlorine chemicals. This is particularly true as a replacement for gas chlorination systems, which have become more expensive and increasingly difficult to find suppliers due to more stringent safety and security requirements.

UV is a particularly appropriate technology where effluent polishing filters are used, as the reduction in particle content of the effluent increases the transmissivity of the UV radiation through the water, which improves its effectiveness. Well-run activated sludge plants without filtration can successfully employ UV, however. Given its advantages and lack of residual environmental impact, there is an industry-wide trend toward the use of UV disinfection technology, particularly where effluents are discharged to biologically sensitive receiving waters. The Juneau-Douglas WWTP and Soldotna WWTPs, neither of which employs effluent filtration, have been successfully retrofitted with UV systems.

As with the upgrade alternatives discussed above, an influent preliminary treatment system was recommended to screen large solids and grit from the influent, particularly as future flows will include a lower percentage of STEP influent and a higher percentage of conventional sewage with more solids.

- **Sequencing Batch Reactor (SBR)** – essentially a single-tank activated sludge process with nitrogen removal capability using alternating aerobic, anoxic, settling, decanting, and filling cycles. Usually, two or more reactors are installed to allow flexibility in accommodating variations in flow and for system maintenance. SBR is a proven secondary biological treatment alternative in Alaska with installations ranging geographically from Juneau (Mendenhall), to the Teck Pogo gold mine in the Interior of Alaska, to North Slope oilfield operations. The effluent quality typically meets standard secondary effluent criteria of less than 30 mg/L BOD and TSS. UV disinfection of the final effluent is used in the majority of the SBR installations in Alaska.
- **Membrane Bioreactor (MBR)** – the newest of the available advanced WWT technologies, this is a modified activated sludge process that replaces gravity clarification with a microfiltration membrane array. Some manufacturers use a submerged membrane system, with the microfiltration modules (referred to as "cassettes") submerged directly in the activated sludge mixed liquor. Diffused aeration keeps the membranes clear of activated sludge biofilms, which filter the final effluent to a pore size as fine as 0.1 micron, which is smaller than TSS filtration. The final effluent BOD and TSS concentrations are typically very low, and often non-detectable in the lab tests. Other manufacturers use a membrane module outside of the aerator. In either configuration, the activated sludge mixed liquor suspended

solids (MLSS) can be operated at very high concentrations (up to 12,000 to 15,000 mg/L MLSS vs. 2,500 to 3,000 mg/L MLSS in conventional activated sludge systems).

As the final effluent is filtered, UV is a compatible disinfection method for MBR systems. The operation can be sequenced between aerobic and anoxic cycles to accomplish high efficiency nitrogen removal. Disadvantages have been relatively high cost, and the need to replace the membranes every several years or so. Costs have improved considerably over the past five to ten years and the durability of the membranes has improved to the extent that most manufacturers will warranty their membranes for 6 years or more now rather than just 3 years, which was typical less than 10 years ago. There are three small commercial MBR systems operating in Alaska at this time, and several others under construction and more in design, including a new municipal treatment plant for Barrow. This is also the technology that the cruise ship industry installed on most of its fleet that serves Alaska to solve the marine wastewater disposal problems they were encountering several years ago. The MBR installations on the cruise ships are now being touted for their environmental friendliness.

- **Fixed Film Suspended Media (FFSM)** – a combined activated sludge and fixed film secondary biological treatment system using a diffused air-expanded granular clay filter. This process can achieve typical secondary effluent criteria and is capable of nitrogen removal, but suffers from fouling if the influent TSS concentrations are above about 150 mg/L. For this reason, additional primary clarifiers are required for conventional domestic influent.
- **Fixed Activated Sludge Treatment (FAST) and Moving Bed Bio-Reactor (MBBR)** – these are two manufacturer's versions of a similar process, which, like the FFSM system, combines a suspended growth activated sludge process and a fixed film process in an aeration tank. Both have the advantage of a reduced footprint compared to conventional activated sludge, and can be adapted for nitrogen removal with multiple tanks using alternating aerobic and anoxic cycles. The FAST process uses a corrugated plastic packing media for the fixed film growth, while the MBBR uses very small, high surface area floating plastic media directly in the activated sludge basin.

  Effluent quality is typical of secondary biological treatment, but can be enhanced by effluent filtration. UV disinfection after filtration is also an option. Experience with larger installations for both technologies in Alaska is limited. There are several dozen small single family residential packaged FAST plants successfully operating in Alaska, but scaling this technology up to larger, commercial sized systems has seen challenges with odor problems and poor effluent quality. In one case that was resolved by greatly expanding the capacity of the FAST installation to nearly double the original rated capacity of the plant. At that sizing that plant is working acceptably serving a large hotel property in the Denali Park area.

  There is only one MBBR package plant in operation in Alaska at this time, and very little experience elsewhere in the US. The process demonstrated very rapid startup capacity in its first year of operation, but also encountered some mechanical difficulty with pumping and other support systems. It is our opinion that both of these technologies lack the desired level of robustness in larger installations that is needed to confidently recommend them for the Wasilla WWTP project.

The master plan compared the first three replacement alternatives and ranked MBR slightly higher than SBR, with FFSM a lower ranked third option. We are of the opinion that that ranking order from the master plan is still valid, and that the additional technology options listed (FAST and MBBR) would likely rank at or below the FFSM system rating. MBR technology and pricing has improved over the past seven years since the master plan was prepared, while SBR has remained a viable, but not significantly improved technology. Thus the advantage of MBR is increasing over the others, particularly in the areas of cost, operating experience, and technology robustness. Also, there are about a half dozen good manufacturers of this equipment providing systems in the US now, with more companies bringing their versions to the market each year, notably with scalable package plant designs.

Summary: The issue of final effluent disposal will largely influence the decision as to which technology is most appropriate for the City of Wasilla. If the percolation field can be upgraded to properly accommodate 1 MGD of effluent and do so without contamination of the groundwater table with nitrate or fecal coliform bacteria, then upgrading the existing lagoon system with the now proven Parkson Corporation aeration diffusers would be a logical and likely cost effective alternative for the City to consider.

If the percolation field is not able to hydraulically accommodate 1 MGD of effluent, and/or if the disposal of nitrate in the percolation field becomes a limiting factor, than expansion of the lagoon system will likely not be practical, and an alternative technology will be required. In that case, it is presumed that an effluent surface discharge will be required and a new discharge permit will be needed. A new permit will likely have standards for BOD, TSS, and fecal coliform bacteria, pH, dissolved oxygen, and possibly nitrogen (nitrate and possibly ammonia), and a maximum allowable residual chlorine concentration. Other parameters may be limited as well. In that case, effluent quality may become the most critical limiting factor, and MBR technology with UV disinfection may well prove to be an optimal solution. Some components of the existing treatment works could continue to be used with an MBR/UV system, such as the septage handling facility, aerobic digester, and sludge drying beds. Finally, SBR/UV also remains a viable second alternative to MBR/UV.

If you have any questions about this report, please contact me at my office in Fairbanks at 907-452-6855, or by email at mrp@ntlalaska.com.

Sincerely,

NTL Alaska, Inc.

Michael R. Pollen

Michael R. Pollen, President

947400

USKH INC.

ARCHITECTURE
ENGINEERING
LAND SURVEYING
PLANNING

UNWIN SCHEBEN KORYNTA HUETTL

WWW.USKH.COM

May 7, 2008

Archie Giddings, PE
Public Works Director, City of Wasilla
290 East Herning Avenue
Wasilla, AK 99654

Project: Sewer Treatment Plant Expansion
Subject: Findings of Geotechnical Investigation

Dear Mr. Giddings:

We are forwarding two copies of the recently completed Wastewater Treatment Plant Geotechnical report for your use. This report is based upon the field work performed by Shannon & Wilson in August of 2007, and prior work performed by MHW, CH2M and Gilfilian Engineering in the 1980's. We are also providing a copy of the completed topographic survey for your use.

As you are aware, the existing percolation fields contribute to the formation of undesirable ephemeral springs at the base of the bluff on the south side of the sewer plant. This is particularly true of the western most fields. The wastewater sampling performed by USKH confirms the presence of wastewater effluent in these springs. USKH had initially believed that construction of new percolation ponds (or buried percolation fields) in the undeveloped lands in the northwest corner of the sewer plant site would provide additional percolation capacity at the wastewater treatment plant, eliminate the undesired discharge from the bluff, and help achieve the projects goal of 1.0 mgd effluent disposal capacity.

However, based upon the completed Geotechnical Report, it appears that even with the construction of new percolation ponds, the maximum effluent disposal capacity available at the sewer treatment plant is limited to only about 0.5 mgd, essentially the same capacity as the existing fields. Due to a layer of low permeability subsoils, the proposed percolation ponds are of only negligible benefit, and will not increase the disposal capacity of the overall system. The ponds would adversely impact existing percolation fields #8 and #9, and effluent would continue to seep out the face of the bluff. In summary, it appears that the effluent disposal capacity of the sewer treatment plant cannot be increased beyond current levels on the existing site.

At this time, the Geotechnical Report is complete, as is the topographic survey and all required wastewater analysis. Under the terms of our contract, USKH is to prepare a design study report (DSR) with recommendations for expansion of sewer treatment plant capacity. However, given the recent findings, we are uncertain as to how or if you would like us to proceed with the DSR, as it does not appear that additional capacity is available.

We would appreciate your input on this matter before we continue, to ensure that the DSR is productive and of use to you.

2515 A Street, Anchorage, AK 99503 • Phone: (907) 276-4245 • Fax: (907) 258-4653 • 1-888-706-8754

We apologize for the time it has taken to get to this point. We will do our best to complete the DSR and future tasks as may be required in a much more expedient manner. As always, if you have questions about this project, or wish to discuss the geotechnical findings, you may reach me or Zane Shanklin by phone at 276-4245, by email at dsyta@uskh.com, or in your offices upon request.

Sincerely,
USKH, Inc.

Dean E. Syta, P.E.
Senior Engineer

Attachment: Geotechnical Report, Topographic Survey

cc: Zane Shanklin, USKH
Tim Vig, USKH
File

Work Order: 947400

DES/des i:\947400\corres\archic001.doc