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Alaska's Capital City

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DATE: 27 October 2014

TO: Assembly Committee of the Whole

FROM: Samantha Stoughtenger, PE – Wastewater Utility Superintendent
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RE: Biosolids Shipping and Alternatives Selection Process

This memorandum provides background information on shipping of the biosolids and clarifies the alternatives selection process from Phase I to Phase II for the biosolids evaluation.

Shipping History:

After the CBJ biosolids incinerator was decommissioned in 2010, the City and Borough of Juneau (CBJ) began landfilling the wastewater biosolids through a contract with Waste Management (WM); this temporary measure was employed while a long-term solution was sought. WM subcontracted biosolids transportation between Juneau and Seattle via barge with Alaska Marine Lines (AML) and from Seattle to Arlington, Oregon via rail with Union Pacific Railroads (UP) for the final disposal in the Columbia Ridge Landfill. At the time, shipping and landfilling appeared to be an acceptable and cost effective way to manage the problem on a short-term basis. Operationally, however, the shipping process was challenged from the start. The first real signs of trouble occurred in the summer 2012 when the turnaround time on the shipping containers was insufficient; as such, shipping stagnated and biosolids began accumulating at the facilities. The truly tenuous nature of shipping biosolids became more apparent by the week. Then, during the hot and sunny 2013 summer, the WM owned shipping containers created an even more problematic scenario where both AML and UP refused to transport the biosolids due to leakage, odor, potential contamination of other shipped products and transportation employee health concerns. Immediate action needed to be taken, CBJ purchased 60 specifically designed and constructed sealed biosolids-hauling containers and continued efforts to identify a long-term solution. In late 2013, AML became the only barge line in/out of Juneau. Then in early 2014, the original WM disposal contract expired, requiring CBJ to sign a new 5-year contract with WM. This new contract allows WM to walk away at any time with no consequences leaving CBJ in a perilous situation. If a long-term option is not implemented soon, CBJ could be left with no way to ship out the biosolids and no local alternative for disposal.

Alternatives Selection Process:

This section explains how the ten (10) treatment and (3) disposal alternatives developed in 2012/2013 under the Phase I TetraTech 'Biosolids Management System Alternatives Study and Matrix' were refined to the four (4) options examined in the 2014 CH2M Hill 'Biosolids Treatment and Disposal Evaluation – Phase II'.

In the Phase I study, CBJ worked with Tetra Tech to provide a general overview of 10 treatment processes and 3 disposal strategies. The goal was to understand the spectrum of treatment and disposal options that may be viable for Juneau. During the process of research and evaluation, the following two governing principles were established for further analysis and decision making:

- **Produce a Class A biosolid.** This refers to the United States Environmental Protection Agency (USEPA) classification for biosolids pathogen characteristics. A Class A product meets the most stringent pathogen standards, is considered safe for public use, and has the least disposal restrictions; for example it can be used as topsoil in residential gardens.
- **Reduce the volume of the biosolids.** Disposing of biosolids costs money. The more biosolids we have to dispose, the more expensive it is. Juneau has very little land that is of suitable size (multiple acres), flat, uplands, and in areas with compatible uses.

As scoping for the 2014 Phase II study began, the following governing principles were added to further define requirements of the long-term biosolids solution:

- **Allow for multiple end uses enabling ease of disposal.** Available disposal options include landfilling, monofilling, land applying (as a soil amendment), or burning (as a fuel source). Unfortunately, ground appropriate for a monofill or land application is limited, the landfill is nearing its capacity (within 20 years), and the market demand for a soil amendment product is uncertain.
- **Is classified as an established or innovative technology as defined by USEPA for system reliability.** An established technology is used at more than 25 facilities in the United States. An innovative technology may be established overseas but has some degree of initial, full-scale tested use in the United States.

Several of the Phase I study alternatives focused on the improvement to overall plant performance and subsequently required additional treatment processes to produce biosolids that could be handled and disposed locally. **Defining an improved biosolids treatment technology that allows for a long-term disposal solution is the key focus for this project.** As such, alternatives from the Phase I study were evaluated and the elimination rationale is described below:

Aerobic digestion could improve the overall treatment performance and reduce the quantity of biosolids produced but would only produce a Class B product (which has few to no local reuse options). With a low solids content, the end product makes handleability very difficult. To allow for local disposal, this treatment technology would require further treatment, and was therefore eliminated.

Composting was not carried forward into Phase II due to the uncertainty in market demand for the large volume of end-product and the consistent supply of significant quantities of buffering materials, such as wood chips or tires. Further, the process requires a large, flat, upland area of ground for operation and maintenance of the facility.

Anaerobic digestion is primarily a wastewater treatment process enhancement which was not advanced to the Phase II study. It has the capacity to produce Class A or Class B biosolids but would generally require additional treatment to make an end-product suitable for handling and disposal considerations. Additionally, its explosive byproduct generation poses a real public health and safety risk. However, it may produce biogas or other products that could be recycled as heat or fuel but typically requires a waste stream larger than the current CBJ volume and a significant capital infusion to operate as such.

Autothermal thermophilic aerobic digestion (ATAD) would alter the existing treatment process by the introduction of heat and aerobic digestion. Moderate amounts of biosolids would be produced from the ATAD process with low total solids content, requiring additional treatment to enable local disposal. This realization at the beginning of the Phase II study eliminated it from further consideration.

Supercritical water oxidation was not further analyzed as it is still in the research and development phase, considered embryonic technology as defined by the USEPA.

Lime stabilization produces a Class B biosolids which has few to no options for reuse locally. It produces more biosolids than the current status-quo operations. Additionally, lime is very caustic and working conditions can be hazardous.

Lime plus heat stabilization produces biosolids of significant quantities having low total solids content. Handling the biosolids and finding end disposal of this product would be difficult. Additionally, lime is very caustic and working conditions can be hazardous. Therefore, both lime stabilization and lime plus heat stabilization were eliminated from further study.

Various other vendors and interested parties have contacted CBJ with technology proposals (many embryonic and experimental) for wastewater and biosolids treatment. Each of these proposals has been evaluated by the consultants against the goals and governing principles of the project.

Consequently of the Phase I study alternatives, **incineration** and **heat drying** remain viable options with the **status-quo** for comparison. A fourth alternative, **heat drying with a furnace**, was proposed by CH2M Hill in Phase II as it met the goals and governing principles for the project. The CBJ project team added this final alternative to the study as it significantly reduced the end-product volume, allowed for energy recovery, minimized operation and maintenance costs, offered multiple disposal options, and presented a local solution to the biosolids treatment and disposal issue.