

# **Evaluation of Waterless Toilets as Replacement of Honey Bucket in Rural Village of Stebbins, Alaska**

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## **Abstract**

The objective of the feasibility study is to evaluate the waterless toilet to be installed as replacing the honey buckets in rural Alaskan villages. It has been suggested that replacing the honey buckets with waterless toilets could improve personal hygiene level as well as reduce the number of bacteria-borne illnesses in community. Through this feasibility study, potential of replacing the honey bucket system with waterless toilets will be evaluated based on data collected from surveys and interviews with residents who volunteered to install and use the waterless toilets in rural Alaskan village of Stebbins. Once this feasibility test is concluded, recommendations can be made whether further study is required to make decision to replace honey bucket with waterless toilet or collected data would be sufficient enough to either accept or decline the proposal of replacing the honey buckets with waterless toilets, to improve sanitation as well as quality of life in rural Alaskan villages.

## **Introduction**

Since the turn of 20<sup>th</sup> century, our lives have been so much easier and healthier thanks to improvement of water quality and sewer collecting system. Most of people in the United States can't even imagine a life without flushable toilet and clean drinkable water at your conveniences.

However, residents in rural Alaskan villages are still living without conveniences such as flushable toilets and surplus amount of clean water to use at your disposal. Due to geological challenges and lack of fund without villages, roughly 20 percents of rural Alaskan villages does not have water and sewer service run throughout their community. Stebbins, located in St. Michael's Island on Norton Sound, is one of villages that are still without water and sewer services, has no access to clean, potable water, and rely upon honey bucket as their sewage system.

Having honey bucket as sewage collecting system raises concerns for health issue of residents of rural Alaska villages, as residents are continuously exposed to possibility of contacting bacteria-harboring wastewater as residents haul honey bucket to dump to community sewage lagoon. Also, not having clean, potable water raises the concern even higher, as residents have very limited mean to clean them once they contacted wastewater. Constant contact with wastewater could lead into serious illness, as those bacteria could cultivate into life-threatening diseases.

When there's limited supply of clean, potable water available, the best way to prevent such illness would be eliminate the possibility of contacting wastewater. Replacing the honey bucket system with alternative system that is least expensive and easy to maintain for residents would be an answer. However, due to geological challenges, it could be very costly to install long pipeline of sewer service line. Therefore, waterless toilet could be good candidate for replacing the honey buckets.

According to recent researches and studies, the nitrate liquids, urines, are considered as hazardous as it creates a perfect environment for bacteria and other micro-organs to cultivate, especially when it's combined with solid human waste. If solid human waste has not been contacted with nitrate liquid, it is essentially a non-hazardous waste and it could be treated as trash and dumped into landfill as any household trash.

The waterless toilets, also known as urine diverting toilets, could be a solution. Once the waterless toilets has been installed, it will automatically separate the solid waste in the container while it routes the nitrate liquids into urine outlet piping system where it can be directly connected to community lagoon and or a tank to be collected later.

By replacing the honey bucket system to waterless toilets as sewage collecting system, it could reduce the possibility of contacting with bacteria-borne wastewater, and increase the level of personal hygiene and community health.

However, replacing honey bucket with waterless toilet is not cheap, with capital cost of \$1395.00 per waterless toilet. Because of its higher capital cost compared to honey buckets, residents might be hesitant to change to waterless toilets. However, if residents consider the conveniences and healthier environment it could bring, waterless toilets shouldn't be crossed-out from its possibilities.

## **Experimental/Project Design**

In order to evaluate the waterless toilet as replacement of honey bucket, completing a feasibility study with help from the residents of Stebbins.

To complete the feasibility study to assess the waterless toilets, the most appropriate method would be attending a city council meeting in Stebbins, where I could have an informal presentation regarding the nature of the study as well as informing the residents with waterless toilets. During the city council meeting, a quick, comprehensive survey will be collected regarding what residents thoughts toward current sewage system – honey buckets. From this survey, data will be collected in measure of how many residents are satisfied/unsatisfied with current system and what kind of improvement that they seek.

Also, at the same meeting, roughly 5 to 20 household, depend of size of volunteers, will be selected to install waterless toilets for a trail period of 6 to 8 weeks. The size of sample as well as the duration of sample all varies depend how quickly I can secure the fund to purchase the waterless toilets purchased, delivered, and installed to each household.

The waterless toilets will be purchased from LifeWater Engineering Company in Fairbanks, Alaska, and the fund to purchase waterless toilets will be funded through the U.S. Public Health Services grant programs. I had to seek out the fund from U.S. Public Health Services because the price per waterless toilet is \$1395.00, and this study will eventually relates to community health issue.

Once the waterless toilets have been installed, members of selected household will use it for next 6 to 8 weeks to evaluate its usage. Once the trial period is over, I will visit the village and conduct an interview with each member to assess its possibility of replacing the honey bucket.

The criteria of evaluating the waterless toilets are:

- Easiness of installation
- Easiness of maintenance
- Easiness of usage
- Easiness of emptying solid waste container and urine tank
- Improvement of household hygiene level
- Residents' satisfactory level; and
- Recommendation to other residents or not.

Based on listed criteria, collected data and survey will be evaluating the waterless toilets for its possibility of replacing the honey bucket.

## **Anticipated Results**

It is anticipated that waterless toilet would be a good candidate for replacing the honey buckets to increase personal hygiene level as well as the community health. However, in order to determine its effectiveness in reducing the bacteria-borne diseases to residents requires further studies, for a city council and choose waterless toilets as replacement of honey bucket.

Regardless of what end result would be, this feasibility study still prove that waterless toilet can be a good candidate as alternative sewage system in rural Alaskan villages where sewer service pipeline cannot be constructed.

## **Project Budget**

The expected cost to conduct this feasibility study are exclusively related to travel expenditure to Stebbins.

Since the cost of waterless toilet will be funded from U.S. Public Health Services, it has been excluded from this preliminary budget.

The breakdown of preliminary project budget as follows:

<b><u>Item</u></b>	<b><u>Quantity</u></b>	<b><u>Subtotal</u></b>	<b><u>Total</u></b>
Roundtrip Ticket to Stebbins, AK from Era Airline for Informal Meeting	1	\$700.00	\$700.00
Roundtrip Ticket to Stebbins, AK from Era Airline for Interview with Residents with Waterless Toilets	1	\$700.00	\$700.00
Lodging Fee in Stebbins, AK	2	\$150.00	\$300.00
Survey Form Print Runts (Initial and Final)	100	\$2.00	\$200.00
<b>GRAND TOTAL</b>			<b><u>\$1,900.00</u></b>

## **Project References**

Del Porto, D., & Steinfeld, C. (2000). *The Composting Toilet System Book: A Practical Guide to Choosing, Planning, and Maintaining Composting Toilet Systems, a Water-Saving, Pollution-Preven.* Ecowaters Books.

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Mihelcic, J. R., Fry, L. M., Myre, E. A., Philips, L. D., & Barkdoll, B. D. (2009). *Field Guide to Environmental Engineering for Development Workers: Water, Sanitation, and Indoor Air.* American Society of Civil Engineers.

Stintzing, A. R., Jönsson, H., Schönning, C., Kvarnström, E., & Ganrot, Z. (2007). *Urine Diverting Toilets in Climates with Cold Winters: Technical Considerations and the Reuse of Nutrients with a Focus on Legan and Hygienic Aspects.* Utrecht/Munich: Women in Europe for Common Future.



## **Project Timeline**

The timeline is subjected to change, depend on actual date of travel to attend city council meeting in Stebbins, as well as required time for delivery of waterless toilets from LifeWater Engineering Company in Fairbanks.

Also, funding from U.S. Public Health Services to purchase waterless toilets could affect the timeline of the project.

The preliminary timeline of project as follows:

<b><u>Time Period</u></b>	<b><u>Description</u></b>
Mid/Late January	<ul style="list-style-type: none"><li>• Travel to Stebbins, AK for Informal Meeting / Presentation</li><li>• Selection of Households to Install Waterless Toilets</li><li>• Order Waterless Toilets from LifeWater Engineering Company</li></ul>
Early/Mid February	<ul style="list-style-type: none"><li>• Installation of Waterless Toilets</li></ul>
Mid February to Late March	<ul style="list-style-type: none"><li>• Residents to Try Waterless Toilets for Evaluation</li></ul>
Late March	<ul style="list-style-type: none"><li>• Travel to Stebbins, AK to Collect Data and Survey from Residents with Waterless Toilets</li></ul>
Early April to Mid April	<ul style="list-style-type: none"><li>• Analyze Collected Data from Residents</li><li>• Finalized the Assessment and Evaluation</li></ul>
Mid April	<ul style="list-style-type: none"><li>• Presentation</li></ul>
May 30, 2012	<ul style="list-style-type: none"><li>• Submit Final Written Report</li></ul>

## **Appendix**

Application process to U.S. Public Health Services for funding for purchasing waterless toilets to be installed as pilot study in Stebbins has begin in late November, 2011. The grant proposal and application process is handled by Mr. Troy Ritter, Environmental Health Support Manager at Alaska Native Tribal Health Consortium, Division of Environmental Health and Engineering. He can be reached at (907) 729-3600, or via [tritter@anthc.org](mailto:tritter@anthc.org)