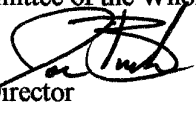


# MEMORANDUM

CITY/BOROUGH OF JUNEAU  
Public Works Department  
5433 Shaune Drive, Juneau, Alaska 99801

**DATE:** May 6, 2009

**TO:** Jeff Bush, Chair  
Assembly Committee of the Whole

**FROM:** Joe Buck, PE   
Public Works Director

**SUBJECT:** Plasma-Arc Gasification & Waste-To-Energy Incineration for Combined CBJ Solid Waste and Sewage Biosolids Disposal.

This memorandum is a cover document to accompany the Letter of Opinion by SCS Engineers concerning the suitability of both plasma-arc gasification and waste-to-energy (WTE) incineration options for disposal of a portion of Juneau's municipal solid waste (MSW). This memo is intended to provide the Assembly with a summary of SCS's recommendations and findings and additional information concerning what the implications and impacts may be of pursuing a gasification or incineration process.

## Background

During the development of the CBJ's Solid Waste Management Strategy in 2007, gasification and/or incineration technologies were not considered feasible. This was due to a number of reasons including:

- 1) CBJ did not control the MSW stream;
- 2) WTE revenue per kilowatt/hour could not compete with lower cost hydro-power production costs;
- 3) citizen support for a WTE facility and operations was questionable;
- 4) uncertain market for sale or use of energy produced;
- 5) high capital cost for planning, permitting, design, and construction of a new incineration facility; and
- 6) cost per ton to landfill (\$120/ton) was significantly less than the estimated cost to incinerate (\$189/ton) at that time.

Since 2007 a number of events have occurred prompting increased public interest in gasification/incineration processes. These new public concerns include odor problems at the landfill, rapid growth of the landfill mound, interest in energy conservation associated with AEL&P's backup power generation after avalanche damage to its transmission lines, and the potential need to replace the sludge incinerator at the Juneau-Douglas Treatment Plant (JDTP) in the near future.

In November 2008, the Public Works Department - Wastewater Utility Division (WWU) received an inspection report from its inspection consultants, Infilco-Degremont, which estimated a remaining operational life of 3 to 5 years for the existing fluidized sand bed incinerator at the JDTP. The report recommended replacement of the incinerator within the next 2 to 3 years. The original capital cost for that incinerator in 1992 was \$14,000,000 and the planning level estimate for its replacement in 2013 is \$17,650,000. The WWU is in the process of getting a second opinion from another independent inspection consultant (Industrial Furnace Company, Inc.) to confirm the incinerator's estimated operational life span and the need for an aggressive capital replacement effort.

With the projected need for replacement of the WWU incinerator, the possibility of co-incineration of both sewage biosolids and MSW could make sense. Incineration of MSW can reduce the volume of landfilled waste by up to 90% thereby significantly extending the operational life span of the existing landfill in Lemon Creek. In

addition, the combined tonnage of MSW and biosolids should result in greater efficiency in operations and a reduced cost per ton for disposal. The possibility of a revenue stream from a WTE program could further reduce the cost per ton to dispose of material making this approach even more attractive. Initial discussions with AEL&P indicate an interest in developing some form of public/private partnership with respect to utilizing the power production potential of a WTE incinerator.

#### SCS Letter of Opinion

SCS Engineers provided a preliminary review of the following disposal technologies:

- 1) Pyrolysis gasification
- 2) Plasma-arc gasification
- 3) WTE incineration

Pyrolysis gasification process is a proven technology with large capacity plants in operation Idaho, California, Arkansas, and Ontario, Canada. These plants are designed for MSW capacities in excess of 100 tons/day.

Plasma-arc gasification process is a newer technology with few successful operational plants. The Plasco Energy Group has a new plasma-arc gasification facility in operation in Ottawa, Canada, which has an initial operational capacity of 85 tons/day and is designed for expansion to 400 tons/day. A few small plasma-arc gasification plants in Japan have been reportedly operating well with a mix of MSW and select industrial wastes. These plants are running up to 200 tons/day of solid waste. SCS is not aware of any plasma-arc process designs that have been developed for co-processing of MSW and sewage biosolids.

WTE incineration is a proven disposal technology for both MSW and sewage biosolids. Successful incineration plants are in operation within the United States and around the world. No new MSW incineration plants have been constructed within the United States in the past decade due to citizen resistance due to environmental concerns, increasingly strict air quality regulations, and lower landfill costs. Increasing public awareness of the environmental impact of landfilling process, technological advancements resulting in cleaner MSW incineration, and the public perception of MSW as a renewable resource for production of energy and electricity has made WTE incineration a more palatable solution for the disposal of solid wastes.

Further engineering feasibility studies, at substantial cost, would be necessary to determine whether this process would be an advantageous method for the CBJ and the Juneau community.

#### CBJ Solid Waste Management Strategy Implementation

Incinerators require consistent burning, at capacity, at consistently high temperatures in order to operate most efficiently. As a result, incineration of MSW seems to work at cross purposes with traditional approaches to recycling. Specifically, papers and plastics help maintain high burn temperatures within the incinerator and offset the harder-to-burn, wetter wastes such as food waste. This practice reduces the need to inject fuel into the incinerator to burn the wetter wastes. In other words, portions of the MSW waste stream, that might otherwise be recycled, would serve as incinerator fuel. Instead of traditional recycling which entails the collection, marketing, and reprocessing of recyclable materials into new products, Juneau's MSW would be largely used to generate energy by the MSW-sludge incinerator.

Should the CBJ elect to pursue incineration of MSW, it would need to undertake expensive engineering feasibility studies to determine whether incineration would be an advantageous waste disposal method for the Juneau community. A choice to pursue incineration would also likely affect the type of recycling program that would be developed and, in turn, the type of equipment used in MSW-recycling collection, since some source or pre-

incineration separation of MSW may be necessary. Introducing incineration could also affect the sequence in which MSW program development decisions need to be made.

The CBJ staff's current work priorities for the program are:

- 1) Develop a draft policy on universal trash and recycling collection services,
- 2) Develop a franchise agreement for waste collection with Alaska Pacific Environmental Services and,
- 3) Transfer the RCA certificate from Alaska Pacific Environmental Services to the CBJ.

The transfer of the RCA certificate to the CBJ will enable the CBJ to direct how the community's waste materials are collected, recycled, and disposed. The sequence of decision-making steps should be frequently reevaluated and modified, as needed, during the development of the CBJ's integrated waste management program.