

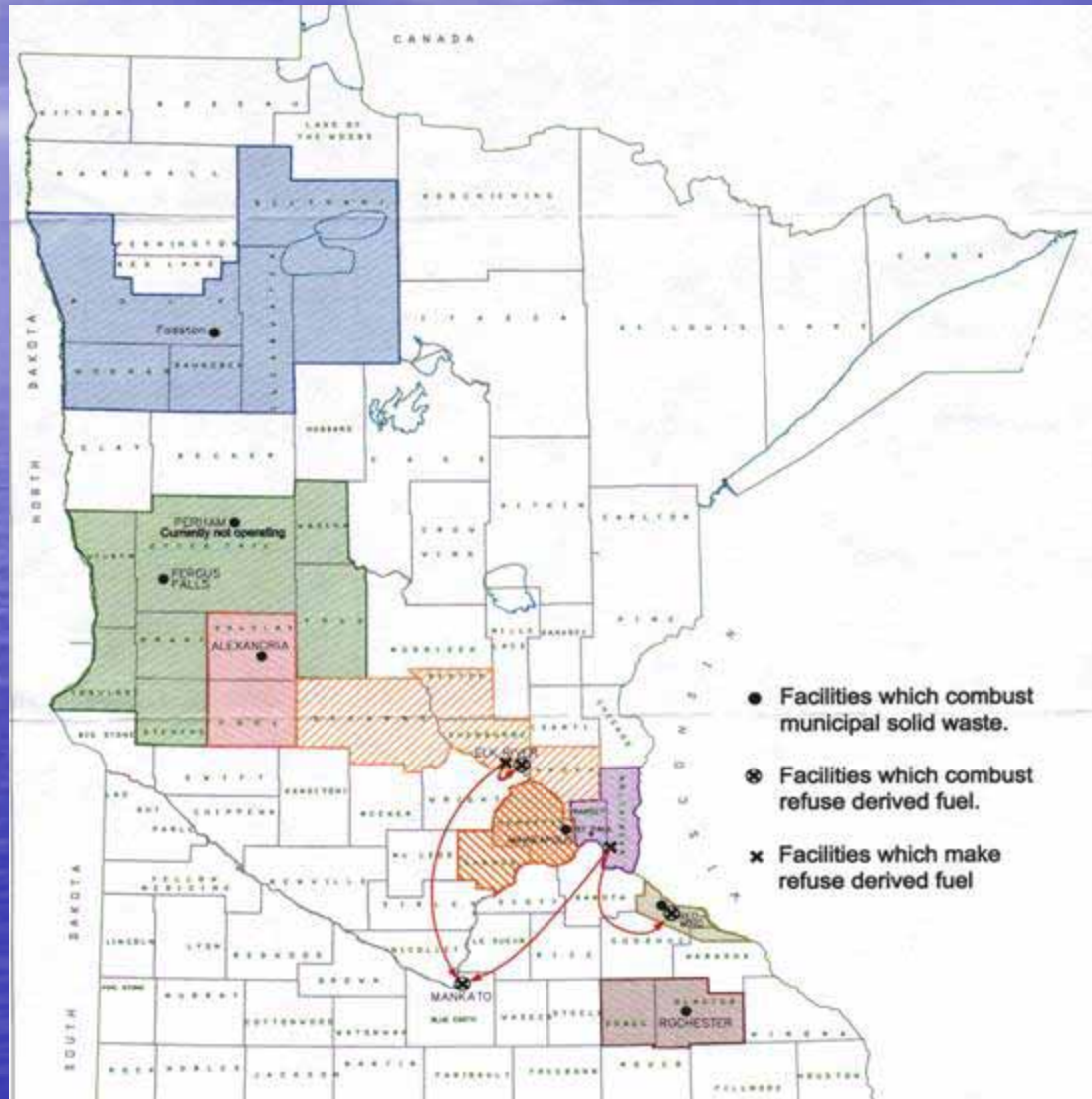
Polk County Solid Waste

Waste Combustor Ash Utilization Projects

February 27, 2008

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Minnesota Counties Served by Waste-to-Energy Facilities



Introduction and Background

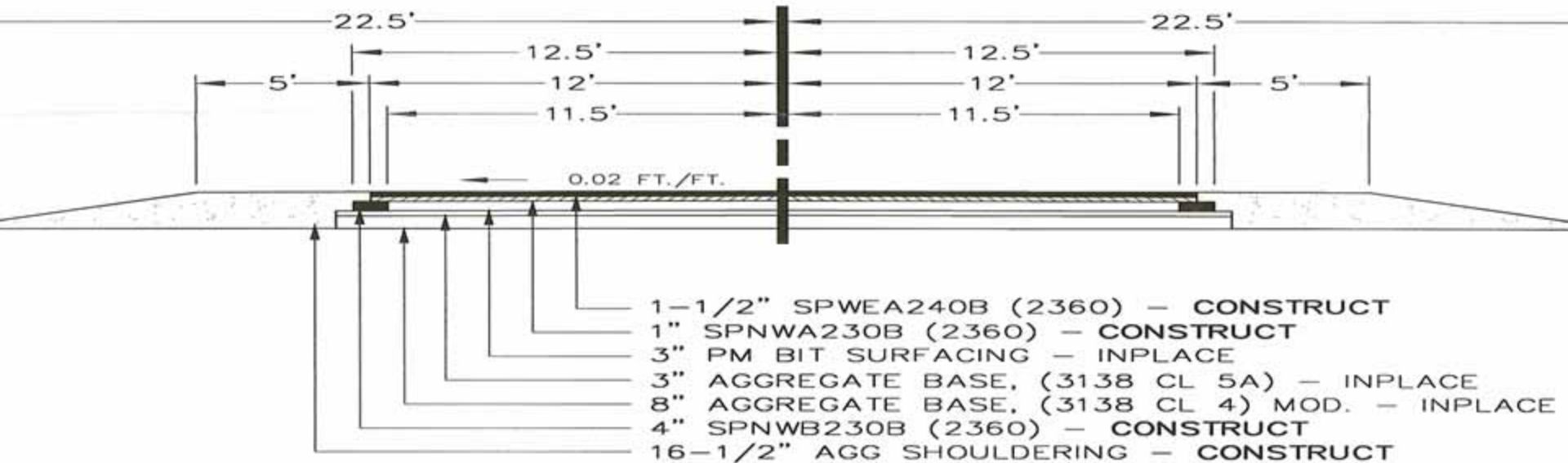
- Polk County participates in a complete Integrated Municipal Solid Waste (MSW) Management Program that includes four other counties in Northwest Minnesota.
- This system includes the operation of a Waste-to-Energy (WTE) Plant to process MSW and produces steam which is sold to three local businesses near the facility.
- Non-Hazardous ash from the combustion process is deposited in lined cells at the Polk County Landfill.
- In 1996 a Materials Recovery Facility (MRF) was installed to remove problem or objectionable items.
- An Air Pollution Control Upgrade Project was constructed in 2000 – 2004 to meet new and revised air emission rules.
- A Turbine/Generator was installed in 2006 – 2007 to use excess steam to produce renewable energy.

Introduction and Background

- Polk decided to follow the lead of the European Union and the UK that requires beneficial use of Waste Combustor ash.
- In 2000 and 2001, Polk County received approval from the MPCA to perform a Demonstration Research Project (DRP) utilizing WTE combustor ash in an asphalt road paving project.
- This project utilized the WTE ash as a partial aggregate replacement (approximately 15%) in hot mix asphalt (HMA) paving materials on Polk County Highway 13.
- The DRP consisted of building and monitoring a section of the road using the ash-amended HMA in the base and non-wear course. Conservatively no ash was included in the wear course asphalt although that is done elsewhere.
- This project consumed 890 tons of screened ash.

CSAH 13

TYPICAL BASE AND SURFACE SECTION



THIS SECTION APPLIES TO THE ENTIRE PROJECT

EST 1-1/2" WEARING QTY = 5,200 TONS
EST 1" NON WEARING QTY = 7,800 TONS
EST 4" NON WEARING WIDENING QTY = 1,800 TONS
EST 16-1/2" AGGREGATE SHOULDERING QTY = 45,500 TONS

PROJECT LENGTH 6.2 MILES

LOCATION: from Crookston, 4 miles East and 2.2 miles North

Introduction and Background

- In August 2004, Polk County completed a follow up DRP using WTE ash again as a partial replacement of aggregate in HMA on County Highway 44.
- Some problems discovered in the first project were resolved and construction methods improved with this DRP.
- Asphalt paving with ash included a two mile section of County 44 leading to the Polk County landfill and a quarter mile section of access road entering the landfill.
- Ash amended asphalt was included in the base and non-wear courses similar to County 13. The access road included ash in the wear course.
- This project consumed 1742 tons of screened ash.

Introduction and Background

- Significant monitoring for the first two projects revealed no negative environmental impacts or personnel health & safety concerns.
- Testing shows that the use of MWC ash resulted in improved Marshall stability and flow, better low-temperature cracking characteristics, and greater pavement load bearing capacity.
- Stack testing for the HMA plant was performed with insignificant impacts reported.
- Preliminary financial analysis shows 'ashphalt' can be economically competitive with asphalt on a per ton basis.

WTE Ash Screening



WTE Ash in Bermed Area



Ash Introduced at Recycle Port



Ash Amended Non-Wear Course



Rolling Ash Amended Asphalt



Introduction and Background

- Data presented in the first County 13 and County 44 Reports is intended to support additional and larger-scale approvals from the MPCA and MNDOT to use WTE ash in asphalt paving projects in Minnesota.
- This data also forms the justification for Polk County's Request for the MPCA to issue a Case-Specific Beneficial Use Determination (CSBUD) which would allow Polk to perform similar utilization projects without further MPCA approval.
- A CSBUD Application was submitted to the MPCA for approval in March 2005.
- Concerns from MPCA Air Quality Division due to a slight increase in stack emissions of mercury when adding ash into the HMA plant has delayed approval of this request.

Introduction and Background

- A third DRP was completed in 2007 utilizing ash in the non-wear course of a 6.2 mile asphalt road overlay project.
- This was a continuation of the first County 13 project and consumed 750 tons of screened ash.
- The primary goal of the third DRP included stack testing to measure mercury emissions with and without the addition of ash.
- Construction followed techniques used in the County 44 project.

Introduction and Background

- Structural performance testing will be performed on this project next summer.
- This stack test reported less than 0.08 pounds or 36 grams of incremental mercury was emitted during 'ashphalt' production for the entire 6.2 miles of paving.
- This trace amount of mercury is considered insignificant.
- A report was submitted to the MPCA February 15, 2008 and a follow up request for approval of the CSBUD was included.
- Over 3300 tons of ash was utilized in the three projects.
- The Waste-to-Energy plant generates approximately 6000 tons of ash each year.

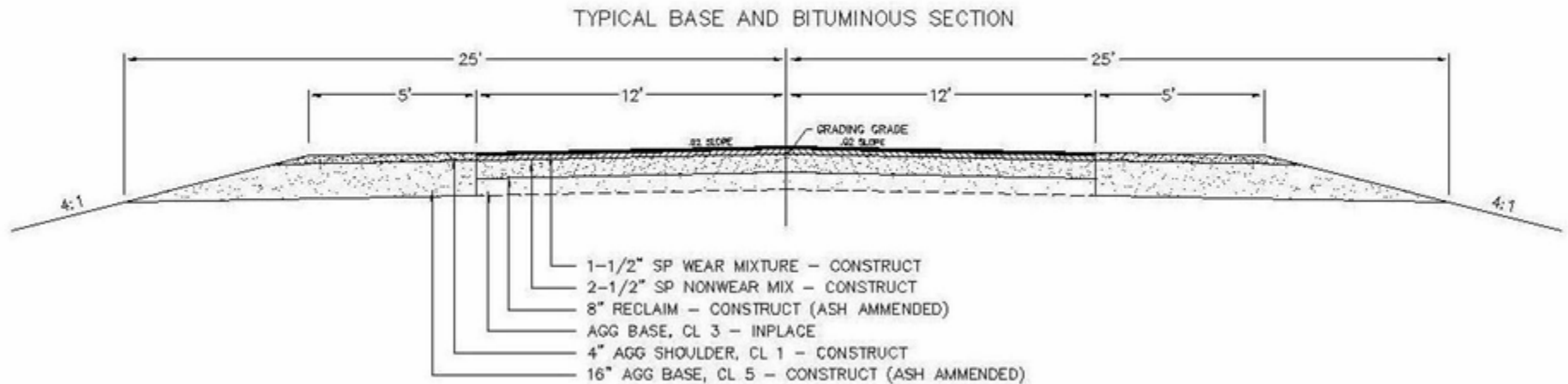
Planned Project for 2008

- A fourth project is planned for the summer of 2008 and also follows the lead of the European Union and the UK in another beneficial use of WTE ash. The goals of this project are:
- Evaluate the feasibility, environmental impacts, and economics of including waste combustor ash in Class 5 materials.
- Continue to investigate the opportunity to utilize as much ash as possible, in the most cost effective way, while maintaining engineering integrity, environmental acceptability, and protecting worker health and safety.
- Re-evaluate and confirm the structural performances of the previous demonstrations.
- Continue to collect data to gain approval from MNDOT for larger scale approvals.

Project Scope and Location

- The Polk County Highway Department has identified a project that is a complete reconstruction of 7.5 miles of County 41, an east west road located 11 miles due south of the landfill.
- The project design includes an 8" aggregate base, a five foot widening section, a two inch asphalt non-wear course, and a two inch asphalt wear course.
- This project will incorporate WTE ash into the Class 5 aggregate mix for the base course under the asphalt and also in the widening section.
- The asphalt, and a layer of virgin Class 5 mix and top soil will be constructed over the ash amended Class 5 for encapsulation purposes.

County 41 Typical Base and Surface Section



Project Scope and Location

- Laboratory testing confirmed that a substitution rate of 20 percent WTE ash in the Class 5 produced acceptable results.
- No ash will be included in the asphalt mix for this DRP.
- This project will consume over 11,000 tons of WTE ash.

Project Objectives

The objectives of this demonstration project will be as follows:

- First to conduct test runs at an aggregate crusher plant to determine the most effective method to blend ash with Class 5 materials.
- Lab testing indicated that water may be added to achieve maximum mix densities and would also help with fugitive dust control.
- A 20% ash addition will be the target rate for this project.

Project Objectives Continued

- Each trial run will consist of 150 tons of ash to be blended with 600 tons of aggregate.
- Density testing, a gradation analysis, and moisture testing will be performed.
- Upon achieving a satisfactory trial blending method, a second objective will be to evaluate placement issues using ash amended Class 5 in the base and widening sections of the road paving project..

Proposed Monitoring

Class 5 Mix Plant - Monitoring Plan

- This plan will address worker health and safety and evaluate surface and ground water impacts both during crusher operations and in the project area.
- Breathing space will be evaluated for personal exposures while combustor ash is being blended with the Class 5 aggregate.
- Air samples will be collected for total airborne dust with ash and (for comparison) during production of virgin Class 5 aggregate.
- The collected samples will be analyzed for total dust, arsenic, cadmium and lead concentrations.

Proposed Monitoring Continued

County 41 Site - Testing & Monitoring Plan

- The Highway Department will run gradations - one every 5000 tons of aggregate. Laboratory testing will be performed for maximum densities and optimum moisture.
- Airborne dust sampling will be performed during placement and compaction of both virgin and the ash amended aggregate at the project site.
- The sampling will include breathing space monitoring for up to three personnel working in the placement area. The personnel to be evaluated will be selected on the basis of greatest dust exposure potential.
- The sample collection period will be as long as practical during the placement.

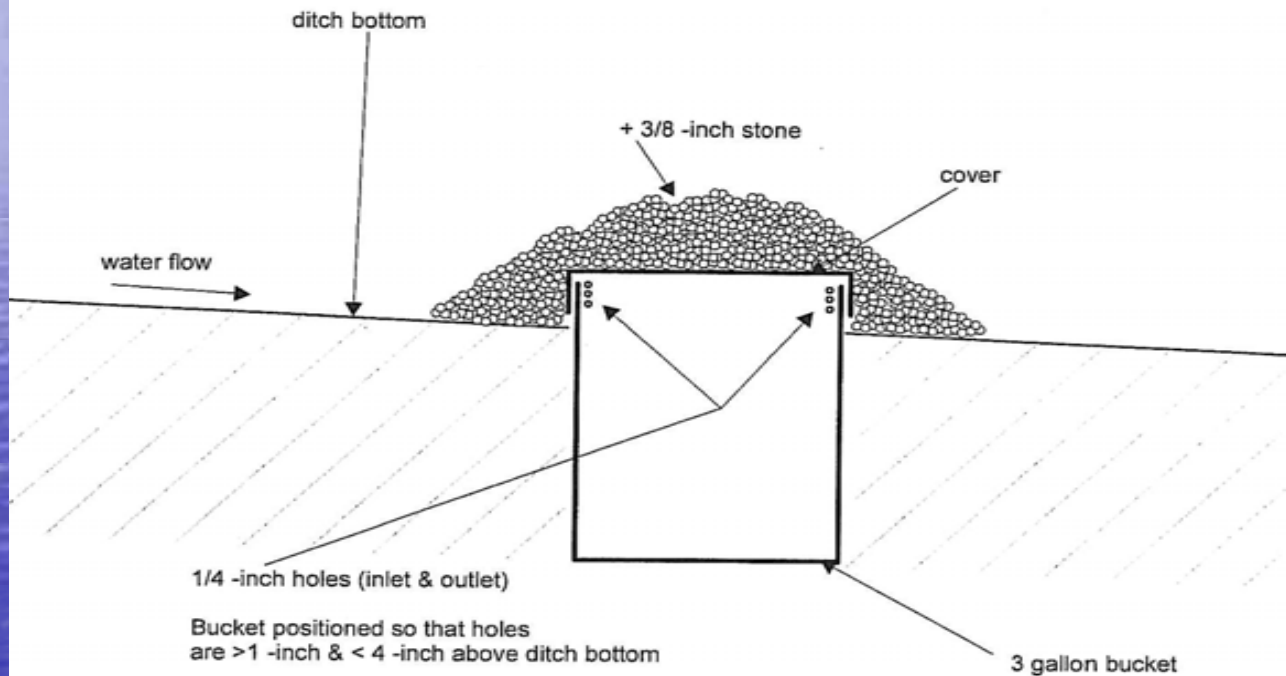
Proposed Monitoring Cont'd

County 41 Site Monitoring Plan

- This part of the plan consists of collecting and analyzing water samples from the ditch adjacent to the project to evaluate environmental impacts of the Class 5 mix.
- Both control and demonstration water samples will be collected and analyzed from water collection devices installed in the base of the ditch.
- Four collectors will be installed along the ash-amended section.
- One collector will be installed upstream as a control.

Ditch Water Collection Device

Figure 3: Ditch-Bottom Water Collector



Proposed Monitoring Cont'd

- The control and demonstration water samples will be collected at the same time, shortly after construction and again several weeks after significant rainfall events (total of 2 events).
- Two composite samples of the ash-amended Class 5 (5 sub-samples each) will be collected from the material being placed during the construction for SPLP leachability testing.
- A complete report including an economic analysis will be prepared and submitted to the MPCA

Ash Utilization Project Summary

- Three utilization projects with ash in asphalt have successfully been completed and a request for a CSBUD is pending approval.
- A Demonstration Research Project Application utilizing combustor ash in Class 5 mix has been prepared and submitted to the MPCA.
- County 41 project design and specifications have been finalized for bidding and award for construction this summer.
- Use of WTE ash in Class 5 appears to have significantly greater use potential than inclusion in HMA.
- Ash utilization will further extend the life of the Polk County landfill.



Thank You

Questions?