

SUMMARY REPORT
FOR
RESEARCH PROJECT HR-188

EVALUATION OF CONTROL DEVICES FOR ASPHALT
PAVEMENT RECYCLING OPERATIONS

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The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of Kossuth County or the Iowa Department of Transportation

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EVALUATION OF CONTROL DEVICES FOR ASPHALT PAVEMENT RECYCLING OPERATIONS

INTRODUCTION

In 1975, Kossuth County initiated its first "hot mix" asphalt concrete recycling project (Iowa DOT Research Project HR-176) [1]. An asphalt concrete roadway was successfully recycled and relaid. The major problem encountered was the excessive air pollution created during the heating and mixing process. Encouraged by the success of HR-176, Kossuth County continued research by letting three hot mix recycling projects with a total of 80,000 tons of mix in 1976. Again, despite best efforts, excessive air pollution was still a problem [2].

OBJECTIVE

The objective of the research project was to seek acceptable solutions to the air pollution problem created in the asphalt recycling process using modified conventional equipment.

PROJECT PLANNING

A project planning and organization meeting was held in March, 1977. Representatives were present from the Iowa Department of Environmental Quality, the Iowa Department of Transportation, the Kossuth County Engineer's Office, three asphalt paving contractors and two equipment manufacturers. The purpose of the meeting was to explain to the contractors and equipment manufacturers the experimental nature of the project and to make certain that Iowa D.E.Q. involvement, mobilization and shut-down payments and pollution testing payments were clearly understood.

Two projects, LRS-575 and LFM-1142, were designated as test projects for pollution control testing. The projects included a total of 19,000 tons of hot recycled asphalt mix. In order for contractors to qualify for bidding the projects, they were first required to submit air pollution control plans to the Iowa D.E.Q.. Pollution control plans were received from three contractors and their equipment representatives.

Testing of emission levels for other recycling projects had consisted only of emission opacity determinations. In order to establish that in fact the asphalt plant was meeting all State and Federal pollution requirements, the contract documents stated that the contractor would arrange for Federal E.P.A. Method V. Pollution Testing. Each test required six hours of steady plant operation to determine particulate levels in the stack emissions.

PLANT POLLUTION CONTROL

The contract was awarded to Rohlin Construction Company. Shown in Figure 1 and Figure 2 are diagrams of the plant layout as proposed by the Iowa Manufacturing Company.

The concept for reducing pollution was to shield the old asphalt coated aggregate from the direct flame of the burner. The process relied on heat transfer from the inner drum and the hot virgin aggregate to the reclaimed asphalt material. Conventional "wet scrubber" equipment was used to clean the emissions with a second venturi added to achieve the desired settings.

The plant was put into production July, 1977. After minor adjustments, the plant operated at 300 tons per hour producing

a 50-50 mix of virgin and reclaimed aggregate at a temperature of 250-260^oF. Pollution tests were performed by the Iowa Manufacturing Company with approval of the Iowa D.E.Q.. Test results during production of the 50-50 mix were well below State and Federal requirements for particulate matter [3]. In August, 1977, pollution tests were run while the plant was mixing 65 percent reclaimed material and 35 percent virgin aggregate. Again, the plant was within the State and Federal particulate requirements. At this mix ratio plant production averaged 349 tons per hour.

DISCUSSION

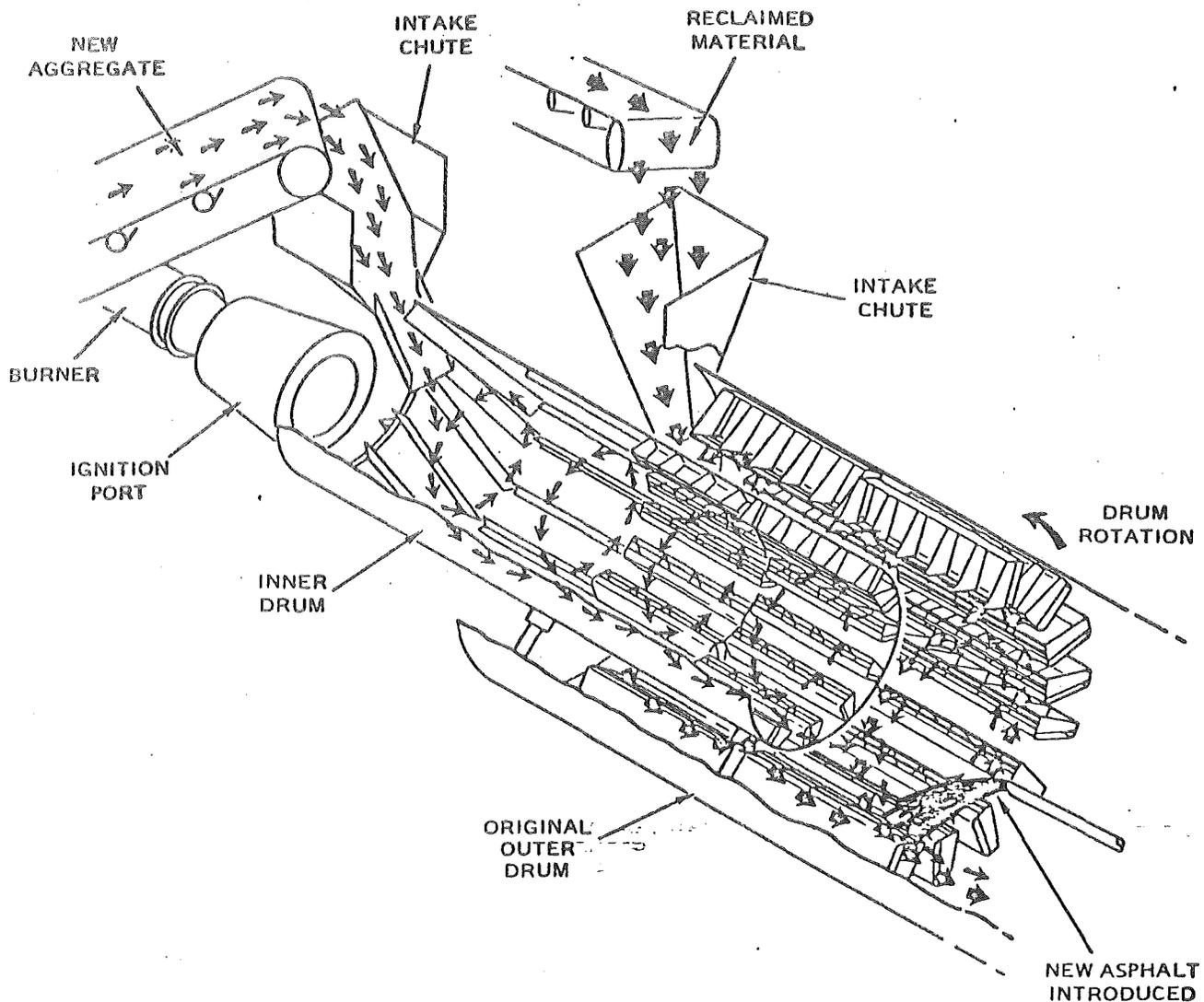
Kossuth County constructed several projects which included a total of over 80,000 tons of recycled asphalt mix prior to 1977. Requirements for emissions were not achieved, despite many attempts by the contractors. The objective of HR-188 was to find a practical way to recycle asphalt pavement and meet pollution control requirements.

The drum within a drum was one solution to separate the reclaimed asphalt material from the direct flame of the burner and reduce the pollution. However, several other equipment manufacturers were working to solve the problem. The common modification for drum mixers is a two-feed system. Virgin aggregate is introduced at the burner end of the drum where it is super heated. The reclaimed material is added at a point halfway down the drum where it is protected from the burner flame by a shield. Heat for the reclaimed material is provided by the hot virgin aggregate and the radiated heat of the burner.

Manufacture of the drum in a drum system was discontinued in 1980 by Iowa Manufacturing Company, mainly because the system was not capable of high production rates. Today, there are about two or three contractors which still use their drum in a drum asphalt recycling kit.

Project LFM-1142 consisted of a 4" overlay and project LRS-575 was 7" full depth recycled mix. After five years both roads are in need of a seal coat. The pavements appear to be slightly more brittle than conventional asphalt pavements constructed. This could be due to the quality of the old pavement recycled and/or the grade of asphalt added to the mix.

Figure 1



With the installation of the asphalt recycle kit, the plant can produce paving material from re-claimed asphalt pavement and save money three ways:

First - - the aggregate costs are lower because less new material is required.

Second - - fuel costs are lower because the recycled aggregate requires less drying.

Third - - asphalt costs are lower because the recycled material enters the plant carrying asphalt that is reused.

REFERENCES

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