THE SUMNER COUNTY MASS BURNING EXPERIENCE

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Discussion by

Junius W. Stephenson
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The first reaction to a paper that reports the necessity for complete replacement of air pollution control and ash removal equipment is likely to be “What a disaster”. But the matter must be put in proper perspective. By comparison with Nashville and other operating plants which have required replacement of major components early on, Gallatin doesn’t look so bad. Consider fiascos such as those at Baltimore, Bridgeport, Disney World, Hempstead, Milwaukee and San Diego and you realize that Gallatin’s problems are relatively minor by comparison. Take into account the facts that the Gallatin plant is combusting refuse and producing energy as intended, that its combustion and air pollution control systems were the first applications of these technologies to municipal solid waste processing in this country, that there is no reported evidence of erosion or corrosion in the combustors or tube wastage in the boilers, that steam production appears to have achieved Harold Meissner’s famous prediction of 3 lb of steam per pound of municipal refuse burned, that the problems are recognized and correctable and that, despite those problems, the plant has operated more than 70% of the time; then it is evident that this paper is reporting a basically successful plant that has had growing pains as have all other refuse to energy plants to date. The author is to be commended for reporting the problems and the means of overcoming them both in Gallatin and by design improvements for the future, as well as the successful features of the design and operation. This information will be invaluable to others who have sense enough to use it as they prepare designs for future waste to energy projects.

While this paper is technical in nature, it brings several questions to mind relating to both technical and institutional aspects of the project:

(1) In his presentation, the author stated the cost of the plant was $9.8 million excluding the value of the site and the electrostatically augmented baghouses which were furnished at no cost to the Authority. What was the total cost including these items and the mechanical cyclone collectors which were subsequently installed ahead of the baghouses?

(2) How did the Authority obtain control of the waste stream in the Country? Was there opposition to this control and, if so, how was it overcome?

(3) What was the incentive to customers to purchase energy produced by the plant? What are the charges to the customers and what is the basis for the charges? Is energy sold on an “as available” or a “guaranteed” basis? Is there a differential in the charge to the one steam customer who returns condensate to the plant?

(4) When will the air pollution control and ash handling equipment replacement be completed? What are the anticipated costs and the effect on charges to energy customers?

(5) Does design of the new electrostatic precipitators include means of keeping burning particles out of the precipitators?

(6) What state or local emission limitations apply to this plant? What are the California standards and what is their applicability to this plant?

(7) What were the results of the February and June
1983 emissions tests by Cooper Engineers and TVA?
(8) Why were tests conducted by TVA and Cooper
Engineers instead of by or for the Authority?
(9) What are EPRI's and the California Waste Manage­
ment Board's interest/involvement in this plant?

Discussion by

Edward J. Sommer, Jr.
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Nashville, Tennessee

The author gives an excellent review of various as­
pects of operation of the 170 TPD (154 tpd) mass burn
facility in Gallatin, Tennessee. He emphasizes operating
problems which have been experienced with various
equipment in the facility and planned solutions are dis­
cussed.

I would like to point out that it is not clear in the
presentation that the Sumner County mass burn facility
operates in conjunction with a materials recovery facility.
The realization of this fact is important to the reader of
this paper in that it has been observed that the burning of
prepared refuse significantly affects the operation of the
mass burn facility (page 590 of the Conference Proceed­
ings).

For instance, in Table 4 the pounds of steam per
pound of waste burned for a three day test by the Tennes­
see Valley Authority in July 1982 is shown to average
2.86 uncorrected for blowdown. However, from Table 3
for the period August 1982 through July 1983, this value
is calculated to be 3.08, a net gain of 8% over the TV
numbers. What is not made clear is that for the TVA tests
the units were burning unprocessed MSW and for the 12
month period shown in Table 3 approximately 57% of
the crane loads of waste fed to the combustors had been
processed for noncombustibles removal by the materials
recovery facility. It is quite possible that the 8% gain
could be due to the burning of prepared fuel. It is also
quite possible that the systems availabilities and main­
tenances could have been affected by burning the en­
hanced fuel.

Slides shown during the author's oral presentation con­
tained steam production data for the first five months of
1984 which was not available in time for inclusion in the
author's paper in the Conference Proceedings. This data
showed values for the pounds of steam produced per
pound of waste burned which were well above the 3.0
level. It needs to be made clear that for those months
approximately 80% of the crane loads of waste fed had
been processed for noncombustibles removal by the
materials recovery facility. Since the Btu content of pro­
cessed fuel is significantly higher than that of unprocessed
MSW, it is probable that the data was strongly influenced
by the burning of processed fuel.

All in all, this is a very good paper containing much
data of interest to the engineering community. The mea­
surements shown on boiler tube wastage are very encourag­
ing and if these results hold up under further testing they
will have important ramifications to the industry. In its
over two years of operation the O'Conner combustor has
shown very good efficiency on unprocessed MSW and an
exceptional efficiency when burning processed fuel.

Discussion by

F. G. Parker
Chattanooga, Tennesse

This is an excellent paper which presents in a very
concise format the excellent history, design, and operation of the
Sumner County facility.

The chronology of the facility is very good in that it
shows how much time it takes to build this type of facility.
The plant was dedicated in June 1982. This date has been
omitted. The significance of this date was that it occurred
exactly two years after the June 1980 ground breaking.

In the plant design section of the paper, we believe that
it would be helpful if references to the figures had been
used in the text.

The author is to be complimented on the factual man­
ner in which he summarized the problems which the
facility has encountered. There are two problem areas —
the corrosion of the strip seals and ash grate slope — that
we wish to discuss. We concur that the baghouse problems
have contributed to the corrosion of the strip seals; how­
ever, the furnace would occasionally go positive due to
exploding aerosol cans and what appear to be small gas
bottles. We believe these instantaneous explosions have
also contributed to the corrosion problem.

Along with being troublesome and time-consuming, as
stated in the paper, the ash grate slope problem also created
a safety problem when the operators had to push the
heavy objects off the grate. At times the manual cleaning of
the grate also compounded the ash drag problem by
overloading the ash drag conveyor, thus causing addi­
tional plant downtime.

We are very impressed by the 90+% availability and
the less than $12,000 maintenance cost of the combustor/
boiler for the 21 months reporting period. We are not
aware of any facility in the United States with a track
record such as this.

The operating summary tells the entire story of the
Sumner County facility. The facility encountered many
equipment problems over the past two years as noted in
the paper. However, the objective of the facility, which is
to process all the combustible waste in the country, has been achieved.

AUTHOR'S REPLY

To Junius W. Stephenson

Mr. Stephenson made a very thoughtful review of my paper and has asked some good questions. I will answer in the order he asked them.

(1) My verbal answer to Mr. Stephenson on the original electrostatically augmented baghouses was misstated or misunderstood. That equipment cost $300,000 and was included in the $9.8 million dollar plant cost.

The mechanical cyclones were added in December 1982 at an installed cost of $35,000.

(2) The State Legislature passed enabling legislation giving waste control to municipal bodies and permitting formation of agencies, such as the Resource Authority in Sumner County. The Authority then contracted for the waste stream for 20 years.

We do not know about opposition at the state level, but there was little or none in Sumner County.

(3) Tennessee Valley Authority purchases approximately 500 kW of electrical power. They were interested in participation in a waste-to-energy cogeneration facility. The three steam customers purchase the steam at 85% of the cost of the displaced fuel. The steam is sold on an "as available" basis. The steam customer who returns condensate receives a credit against the steam purchases on a per 1000 gallons of condensate basis.

(4) The new electrostatic precipitators were installed in May. Some modifications should be completed in July. The ash drag replacements should be completed in July.

(This was written on June 28th.)

The cost for the new ESP's was $555,000 installed, and for the ash drag systems was $238,000 installed.

There will not be an effect on energy customers.

(5) The added mechanical cyclones have been left in place.

(6) The particulate standard in Tennessee is 0.4 grains/dscf. The California standards are 0.1 grains/dscf, and really have no applicability to this plant.

(7, 8 and 9) These can be grouped together. Cooper Engineers was contracted to conduct emissions tests by the California Waste Management Board on the O'Connor combustor technology, because of pending California projects using the water-cooled rotary combustor. EPRI contracted with Sanders & Thomas for a case history of the design and construction of the facility, and EPRI contracted with TVA for performance and environmental testing of the plant. EPRI is interested in waste-to-energy facilities in support of their member utilities' interest.

Neither report has been officially released at this time.

I hope these answers have adequately responded to Mr. Stephenson's questions.

I again want to thank him for his discussion and also thank Frank Parker for his discussion that was read at the conference.

To Edward J. Sommer, Jr.

We did quite a bit of work taking the fact from Sumner County that the NRT people used for their paper plus additional statistics accumulated over a period of time to determine the effects of their pretreating equipment on our equipment.

Rather than get into a more detailed discussion here of our tabulation of all the statistics, we would suggest that you refer to Mr. Healy's answer to the National Recovery Technologies paper.

The bottom line of these discussions is that we can find no statistical fact that would indicate that pretreating the MSW affects the efficiency of our unit. It has helped up until now primarily because of the ash drag out system, but now that this equipment has been completely rebuilt, the pretreating is no longer necessary.

To F. G. Parker

We agree that the two years from ground breaking to on-line is significant.

The corrosion of the strip seals was probably due more to the baghouse problem which caused abnormal backpressure resulting in the furnace and combustor going positive frequently. The original strip seals were copper. Since then we have changed to carbon steel and have had no problems even with occasional positive pressure.

The grate slope problem is being solved by changing the angle of the lower section. This work will be taken care of in the forthcoming shutdown. We would like to point out that if we burn anything but standard MSW, in other words the material you normally throw in your trash can, the original grate design would work, since the steam blowers would handle the ash resulting from the combustion of this material. The problem came about because of an abnormal amount of noncombustible material, such as car parts, pieces of water heaters, etc., coming through the combustor and resting on the lower part of the grate. Needless to say, the steam jets in the grate could not blow a Volkswagen engine off of the grate. By changing the angle, this material will slide on through.

Both the ash drag system and the baghouse have, since the article, been changed. The ash drag is now much
heavier, larger and less subject to jamming. The baghouse has been replaced by an electrostatic precipitator. The new equipment is now working far better.

Mr. Parker has been involved in this project from the beginning so that we really appreciate his comments and his help over the past few years.