# THE

# WASHINGTON SUBURBAN SANITARY

# COMMISSION REFUSE INCINERATING PLANT

T. L. Coleman
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C. A. Hechmer

# SUMMARY

This paper deals with the W.S.S.C. Incinerating plant near Bladensburg, Maryland; the conditions of Prince George's County which made it necessary, and the manner in which it was procured and built. I have described the plant and its equipment, the manner of its operation and a few of the difficulties experienced by the W.S.S.C. in its operation.

Accompanying the data dealing directly with this plant is a resume of the different natural ways of refuse disposal which are being replaced by the modern artificial methods, and a general account of incineration plants, their operation, and attributes.

# THE W.S.S.C. REFUSE INCINERATING PLANT

In treating with the subject of the W.S.S.C. Incineration Plant I will first give a brief treatise of the different refuse disposal methods, and incineration plants and disposal in general.

## PRINCIPAL METHODS OF DISPOSAL

Prior to the 20th Century all of our municipal refuse was handled in natural ways with the exception of a small amount handled by trhee pioneering incinerator plants in New York, New York, Des Moines, Iowas, and Ellwood, Indiana respectfully, where it was handled by artificial means. The natural methods of handling the refuse consisted of:

1. Dumping into large bodies of water--this was the most generally employed method of our sea board and large river cities. In this method the refuse and garbage was loaded on barges and towed to sea where it was dumped. This method resulted in large amounts of garbage and trash being washed ashore and left standing on the beaches and banks.
2. Dumping on land--this method was and in many places still is employed around inland cities and communities. These land dumps are very insanitary as they form admirable places for the breeding of disease carrying insects and sources of offensive odors due to the putrification of the organic material. Dumps consisting of inorganic matter are not so offensive but should still be covered over with clean newly excavated soil in order to enhance

their appearance.

3. Land filling--this method consists of mixing the refuse with large quantities of fairly clean materials such as street sweepings or excavated earth and filling in large depressions or old excavations with this material. In this method unobjectionalbe oxidation of the organic matter may take place rather than putrification.
4. Plowing into the soil--this method is adaptable to very sandy soils. The refuse is spread over the soil and then turned under by plowing.
5. Burial--similar to above method.
6. Feeding to hogs--this is a very old and still a very popular and economical method of disposition. The food value of fresh garbage is sufficiently great to make this method worth-while and many large hotels and eating establishments have found it a profitable means of disposal.

All of these methods with the exceptions of the last are gradually being replaced by the artificial means of incineration or reduction.

THE INCINERATION PROCESS AND PLANT

The incineration process has proved itself the most efficient and practicle means of disposing of large quantities of refuse.

This process of incineration consists of the combination of certain elements in fuels with atmospheric oxygen to produce heat and therewith destroy the organic matter. This necessitates a temperature of between 1200°F. and 1400°F. This temperature is obtained by the

combustion of the combustible refuse or through the addition of a fuel. In many plants this heat is also used in the conversion of steam for other near by projects.

There are at present two types of incinerators in use, the English type which burns a mixed refuse (consisting of organic and non-organic matter) without additional fuel and the American type which is designed to operate with additional fuel. The first type is classified as a refuse incinerator and the second as a garbage furnace. The refuse incinerator is today either hand or mechanically fed depending upon the size of the plant and usually of the top type feed.

The modern incineration plant may be located in close proximity to the residential or business districts for with proper operation there is no objectionable ordors or public nuisances created by it. The only objectionable feature to the surrounding neighborhood being the concentration of truck traffic through its streets. For this reason it is usually best to locate the plant a mile or so from the closely populated areas and still not so far away as to make excessively long hauls necessary.

A properly designed incinerator should embody the following parts with modification of design to meet engineering requirements of the individual plant.

1. A furnace built of brick, heavily braced with structural steel, and containing one or more cast iron or brick grates and ash pits.
2. An opening or special apparatus for charging refuse into the furnace.
3. The necessary ducts, valves and blowers to deliver the

requisite quantity of air into the furnace and bring the oxygen into contact with the combustible parts of the refuse.

4. The necessary flues and chimney to conduct the gases of combustion out of the furnace into the atmosphere. The furnace may also be equipped with combustion chambers to assure complete combustion of the refuse before the gas is allowed to escape into the atmosphere and also preheaters over which the escaping gases are passed. These preheaters heat the air being supplied to the furnace by the forced draft.
5. A means of removing the residual clinkers and ashes from grates and ash pits (this means may be for either manual or mechanical extraction).

THE W.S.S.C. INCINERATION PLANT

The Washington Suburban Sanitary Commission Refuse Incinerating Plant located near Bladensburg, Maryland was built and put into operation during 1939.

This plant was a necessity due to the existing conditions in Prince Georges County brought about by refuse disposition. Prior to 1939 the refuse of the county had been disposed of mainly by means of ground dumps. These dumps were not regulated by any state department until their supervision was delegated to the Sanitary Commission by the State Legislature in 1937. The State Legislature did not, however, delegate any funds with which to carry on the supervision

END ELEVATION

SHOWING STACK AND TOPOGRAPHY OF GROUND

FRONT ELEVATION

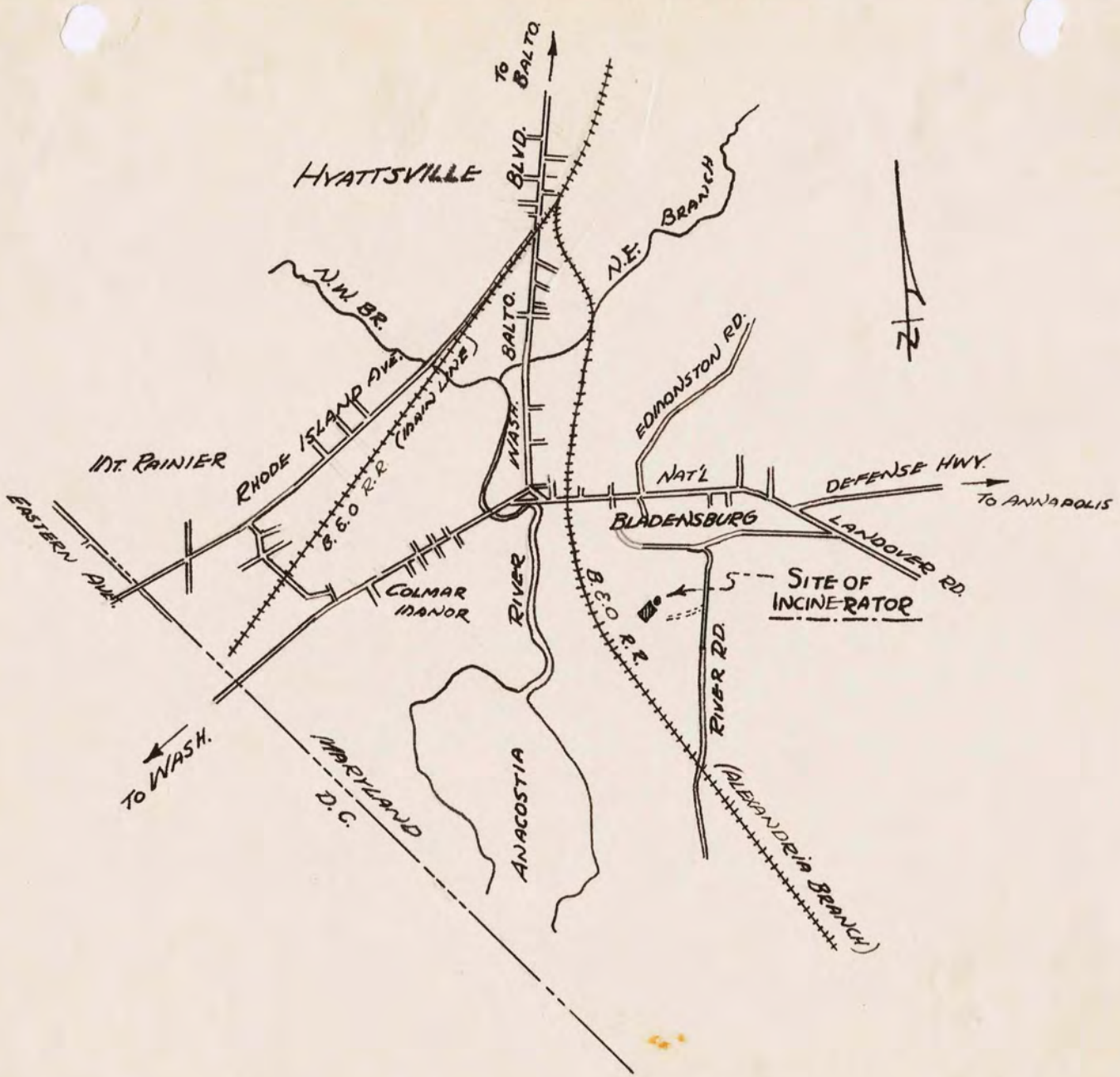
SHOWING THE LARGE ENTRANCE DOORS TO THE RECEIVING FLOOR

so that the existing insanitary conditions and public nuisances resulting from the ground dumps were not corrected. With the following legislature the state authorized a bond issue for the procurement of funds with which in conjuction with PWA Funds to build an incineration plant.

The site of the plant and the specifications for its building were decided upon by the Sanitary Commission. The approximate cost was to be $55,000 and the contract to be let by the Commission to the lowest bidder. The contract was awarded to the Nichol's Construction Company. The site chosen by the Commission for the construction of the plant was near Bladensburg south of the Defense Highway (see accompanying map).

The plant is of the Decare type and consists of a brick building approximately 49 ft. by 33 ft. in plan and 33 ft. high. It consists of two floors, the top floor having direct access for the trucks, containing the receiving floor on which the refuse is dumped and which is equipped with four feeding doors for the furnaces, a small office and a small lavatory. The ramp approach to the receiving floor is equipped with a large scale for weighing the loaded and unloaded trucks.

The bottom floor which is below ground elevation on its east side but due to the topography of the ground is above ground elevation on the west is equipped with two complete furnace units, each capable of operating independently or in conjuction with the other. These units consist of furnaces, combustion chambers, ash pits, preheaters,




SITE OF W.S.S.C. INCINERATOR

SCALE - 1" = 1/2 MILE

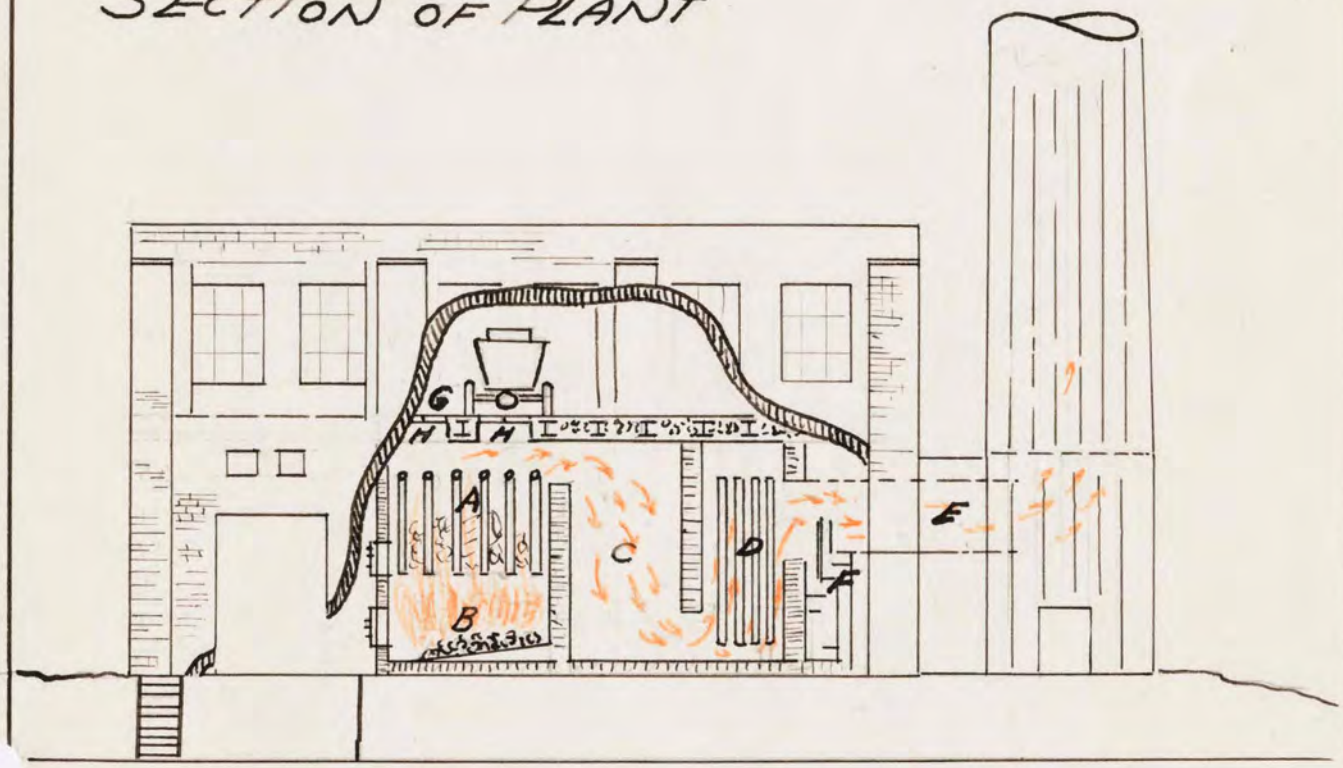
flues, charging openings, dampers, drying baskets, and all other necessary appurtenances for the incinerator complete. The specifications governing these units were drawn up by the commission and closely adhered to by the contractor. All the fire brick for the furnaces was carefully inspected and required to withstand 3000°F. The stack which stands at the southern end of the building was built approximately 80 ft. high and capable of withstanding 1800°F. varience in temperatures.

This plant operates without the use of any fuel other than that supplied by the combustible elements of the refuse and occasionally salvaged wood shavings from the Commission's wood shop to aid the combustion. A close watch is kept of the furnaces and combustion chambers by means of temperature gages and peep holes. The force draft apparatus is equipped with valves capable of passing the air taken from the room at room temperature through the preheating pipes and thence into the furnace or directly to the furnace at room temperature. By operation of this valve any varience of the temperature of the force draft may be obtained with in the range of the room temperature and the preheating chamber.

The refuse first enters the plant from the trucks to the receiving floor. From here it is charged into the furnaces through the charging doors, some seven square feet in area and equipped with swinging steel doors. This charging process is accomplished manually by two men working with forks, one on either side of the charging door and both protected from an accidental fall into the furnace by

REAR ELEVATION

## DIAGRAMATICAL SECTION OF PLANT




A.- DRYING BASKET
B.- BURNING GRATES
C.- COMBUSTION CHAMBER
D.- PREHEATERS
E.- ENTRANCE OF GASES TO STACK
F.- FORCE-DRAFT BLOWERS
G.- RECEIVING FLOOR
H.- CHARGING DOORS

means of leather belts suspended by chains to the roof of the building. The refuse falls through the charging doors into the drying basket. This basket is in the upper half of the furnace and consists of steel pipes approximately 2 inches in diameter spaced at even intervals of approximately 1 foot and having water continually circulating through them. (It is here that steam is generated but due to the varience of amount generated it has not been suitable for any use and is exhausted into the atmosphere.) In this drying basket the moisture is driven out of the refuse and the solids prepared for burning. When the refuse has become sufficiently dry an operator on the furnace level will shake or rake the refuse through the spaces of the drying cradle by means of a long rake inserted into the furnace through the stoking doors allowing it to fall onto the grate where it is burned. The burning gases and particles pass from the furnace through the combustion chamber where the particles are completely burned and then passed over the preheating pipes and thence through the stack into the atmosphere.

The plant handles approximately 35 tons of refuse per day on a twelve hour shift, each furnace unit being capable of handling 35 tons on a 24 hour run. This allows a break down of one furnace without interuption to plant operation.

The actual operation is carried on by a shift of six men, the men's hours being so scheduled that the whole shift will be

present during the rush periods and only three or four men on duty during the period prior to operation in the morning and during clean up period in the evening.

DIFFICULTIES OF OPERATION

The main difficulty encountered in the plants operation is due to the type of community served by this incinerator. This plant is primarily for the purpose of disposing of the refuse of Prince George's County, a county in which there are a great many unincorperated communities which must rely upon free lance collection. These free lance collectors make agreements with the residents of a community to collect once or twice a week their garbage and trash in return for a certain fee. The county has very little control or regulation over these men and as a result the collections are made at any time which the collector finds convenient. This results in a very confusing condition at the incineration plant as it is impossible for the operators to set up a schedule for the handling of the refuse prior to the arrival of the trucks at the plant site. For this reason at one time of day the receiving floor on which the garbage is dumped may be practically clear and the plant running well under its capacity, immediately following this lapse in operation the trucks start rolling in and in short order the receiving floor is loaded to capacity, the operators over worked and the plant operating at full capacity and still being inadequate to care for the concentration of material. This condition can be rectified only through close regulation of collection schedules. The plant should be able to build

up its fires in the morning and when the incinerators are ready to start operations the first trucks should roll in and these be followed periodically through the day by other trucks thus allowing the plant to operate steadly and never to become over loaded. Such a collection schedule could be set up but only through close cooperation of the collectors could it be carried out.

Another problem of plant operation is the separating of the non-combustible materials (tin cans, glass bottles, etc.) from the combustionible matter. The plant is incapable of taking care of this incombustible refuse as the grates of the furnaces have no mechanical means of dumping their ashes. The ashes must be cleaned out by hand and if tin cans and glass which would fuse and form clinkers was allowed to be put into the furnaces the grates would quickly become clogged and the volume of unburned material which would necessitate removal would be to great to me manually handled. It is for this reason that the Sanitary Commission requires that the collectors keep the combustible and the non-combustible refuse seperate. In order for this to be successfully accomplished the general public must cooperate in this separation and not mix its combustible and non-combustible refuse.

The plant at the present time takes care of the non-combustible, refuse on a dump behind the building where it is carefully cared for and covered with newly excavated earth thereby having no affect on the generally neat aspect of the plant.

SUPERVISION AND MAINTENANCE

The plant is under the supervision of Mr. C. A. Heckmer, Maintenance and Operation Department Engineer of the Sanitation Commission.

The finances for the maintenance of the plant are derived from a charge of $1.00 per ton for the refuse burned, chargeable to the truck operator with a minimum of $.25 per load.

This plant will ultimately form a part of a large Commission development as a sewage disposal plant is now in course of construction in the same locality.