ITEM	7
MANAGER'S REPORT NO.	55
COUNCIL MEETING	1981 11 09

RE: REFUSE DISPOSAL

MUNICIPAL MANAGER'S RECOMMENDATION:

1. *THAT the report the Director Engineering be received for information purposes.*

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TO: MUNICIPAL MANAGER 81 11 04

FROM: DIRECTOR ENGINEERING

SUBJECT: REFUSE DISPOSAL

RECOMMENDATION:

1. THAT this report be received for information purposes.

SUMMARY:

Although we are convinced that for environmental reasons we will eventually be forced to adopt thermal treatment for solid waste disposal, we feel that the high capital cost, the prohibitive amortization costs due to present day interest rates, and the difficulty of selling recoverable energy in the B.C. market, make the use of thermal treatment economically unsound at this time.

REPORT:

For some time now the Engineering Department and Municipal Council have been deeply concerned with the future provisions for refuse disposal and have, on several occasions, brought this pressing matter to the attention of the Greater Vancouver Regional District.

The Coquitlam Landfill, which is owned and operated by the Greater Vancouver Regional District (G.V.R.D.), presently serves the Municipalities of Burnaby, Coquitlam, Port Coquitlam, Port Moody, and New Westminster and, according to G.V.R.D. estimates, will be at capacity sometime in 1983.

Burnaby staff and Municipal Council continued to press G.V.R.D. for a firm commitment with respect to future disposal methods and sites and were concerned for the following reasons:

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1. The Coquitlam Landfill site would be in operation, at best, until 1983.

2. Haulage distances to suggested landfill sites in Burns Bog, Langley or Pitt Meadows would very severely tax our fleet of refuse trucks which are not designed for long distance highway travel.

3. With so little time available, immediate steps would have to be taken to design and build transfer stations or to design and build alternative disposal using thermal treatment.

In 1980 May, G.V.R.D. staff produced a comprehensive report on "Alternative Methods for Disposal of Municipal Refuse". This report was augmented by a report from Albery, Pullerits, Dickson & Associates, a group of consulting engineers in Toronto. Burnaby participated in the cost-sharing for this latter report and copies were made available to the members of the Burnaby Pollution Committee and to members of Council.

G.V.R.D. staff and their Consultants concluded that costs for thermal treatment of refuse for the Corporation of Burnaby would be in the $35 to $48 per ton range.

In order to facilitate a better understanding of these highly technical reports, Council authorized visits by staff and/or members of Council to locations where plants of various types were in operation and to otherwise become familiar with the "state of the art" in the thermal treatment of refuse. Two senior members of the Engineering Department were involved in doing this and their findings are presented in this report.

A. International Conference on European Waste-To-Energy Technology, Reston, VA, 1980 November.
The Director Engineering, E.E. Olson, attended this Conference.

BACKGROUND

Since 1896 (in Hamburg, West Germany), communities have been converting municipal refuse into electricity and other energy uses. Many of the early systems were batch operated with manual refuse feeding and manual ash removal.

Between the two world wars, many developments were made in refuse handling in general and grate systems in particular. There were also major improvements in the refractory wall furnaces and the separate waste heat boilers.

Many of the systems were destroyed during World War II. The evolution of the water tube wall integrated furnace/boiler began in the 1950's. It paralleled developments 30 years earlier in the water tube walled pulverized, coal-fired boiler/furnace.

More precisely, the world's first integrated water-tube wall furnace/boiler began operation in Berne, Switzerland in 1954. Two 100 tonne per day units produced steam to make electricity. Some steam was sent to industry. Other steam was sent to a steam-to-hot-water heat exchanger. This hot water was then sent to the local district heating network. This original Von Roll plant continues to operate 27 years later.

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The business of designing and building those and other waste-to-energy systems has grown exponentially since 1954. Now at least 522 places in the world can be pointed out where energy conservation objectives are met by recovering values.

MAJOR CONCLUSIONS

The major conclusion was that the mass burning of unprepared municipal solid waste in heat recovery boilers is well established, and can be a technically reliable, environmentally acceptable, and reasonably economic solution to the problem of disposal of solid waste. It is not as cheap as use of currently available landfills. However, as time progresses and current landfills require upgrading and new landfills come under stricter regulations, these mass burning waste-to-energy systems are expected to compare more economically with true sanitary landfills.

Another significant conclusion was that many European areas are moving steadily in the direction of Energy and Environmental Parks that often include refuse burning, animal rendering, electricity production, sewage disposal, industrial steam generation, hot water district heating, and other "secondary" undertakings either singly or in various combinations.

A very surprising conclusion was that over a wide range of plant sizes from 200 to 1,600 tons per day there appeared to be little significant economy of scale. The data suggested that the net operating and owning costs for plants within these size ranges and with the same plant configurations normalized for inflation, exchange rates, site costs and so forth fall in the range of $6 to $36 per ton with the average about $16. While this range appears significant, the factors that cause the variation are not size-related as much as was previously thought.

A major impetus for the development in Europe of waste-to-energy systems was the finding that it was possible to control air pollution from the burning of wastes by cooling the dirty exhaust gases. Concurrent with this influence was the disenchantment with old leaching landfills as a long-range solution to the solid waste problem in very crowded countries.

The cost of alternative energy forms (coal, oil, gas) will become even more important to the development of refuse-fired energy systems. Yet the total potential energy in the wastes of a modern community will be less than a tenth of its total energy demand. Hence, waste-to-energy alone cannot be expected to become a major energy source.

Many conditions in the U.S. and Canada have been different, hence waste-to-energy has not advanced as in Europe. Some of these difficulties will continue, but we are moving rapidly to similar conditions in most of our metropolitan areas. Hence the lessons that have been learned in 80 years of refuse fired energy plant (RFEP) experience in Europe will eventually be effectively utilized by many U.S. and Canadian communities.

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B. Site Visits by Assistant Municipal Engineer M. Ross in 1981 October and earlier.

1. City of Bellingham

The modular type "Consumat" system in Bellingham was visited by staff on one occasion and on another occasion by staff and some members of Council.

This is a controlled or starved-air semi-pyrolysis form of incineration. The modular units have a capacity of 50 tons per day and are more suitable for the smaller cities and communities than for areas of dense metropolitan development.

We were not convinced that requisite economies of scale could be achieved for Burnaby's requirements by constructing a battery of five of these modular units. In addition, we were not impressed by the "end product" with respect to complete combustion.

2. City of Redwood - California

This 50 ton/day experimental plant was being operated by Pyro-Sol Incorporated and was a pyrolysis or gasification plant which was moderately successful using wrecked automobile upholstery "chaff" and/or woodchips.

There were some "scrubbing" problems with pyroligneous liquids and demonstrations with Municipal refuse were not given.

It is generally agreed that the pyrolysis system for municipal refuse is still in the development stages.

3. City of Chicago (Northwest), IL
City of Harrisburgh, PA

Both these plants are of the mass-burning type with reverse reciprocating grates, and furnaces with water cooled walls which produce the recoverable energy in the form of steam. These plants are designed by the Josef Martin Company of West Germany and the North American Market is serviced by U.O.P. Incorporated who design, construct, test, place in operation, and finance all aspects.

U.O.P. Inc. is a major U.S. company with seventeen divisions, one of which is the Solid Waste Systems Division. They are actively involved in research and development, manufacture of diversified products and the development of industrial processes including highly technological developments for the space program.

Mr. Ross spent a whole morning with Mr. Lewis Ward the Director of Marketing, his financial advisers, and two senior members of their engineering department. The main thrust of the discussion was the economic viability of the Martin System with respect to the needs of the Municipalities now using the Coquitlam Landfill.

The best efficiency range for the Martin System is found to be in plants ranging from 700 tons per day to 2,000 tons per day which made the Harrisburg plant a focal point for discussion, since the plant size is 720 tons per day which would be ideal for the requirements of the five Municipalities using the Coquitlam Landfill site.

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U.O.P. staff set up appointments for visits to the two plants and they were most helpful in providing advice and arranging for continued consultation.

Mr. Ross found the Harrisburg plant to be well-organized, efficiently-run and the results were comparable with the standards claimed by the manufacturers. From 1972 until 1979, the plant operated at a loss with costs ranging from $13.58 per ton to $21.17 per ton. In 1980, the operating cost was $4.12 million with a revenue of $4.52 million, showing a first-time profit of $400,000. When considering these figures, it should be remembered that the initial plant cost was $8.3 million and the Labourer III rate is little more than half of that paid in the Lower Mainland of British Columbia.

The same plant built today would be approximately $60 million in Canadian dollars.

Council should be aware that the Water and Waste Committee of the G.V.S. & D.D. is in the process of calling bid proposals for the construction and operation of a bulk transfer station for the use of the five Municipalities who now use the Coquitlam Landfill. The transfer station itself will almost certainly be located on the site of the present Coquitlam Landfill; the actual disposal site to which the refuse would be hauled has not yet been finally chosen, but the G.V.S. & D.D. has studied in detail five possible sites and has a program calling for the development of a site in "...the eastern area...".

It is realized that the use of a transfer station and hauling refuse to a more distant site will have an appreciable impact on our refuse disposal budget allocation (in all likelihood not before the 1983 Budget) and therefore Council will certainly be provided with all the relevant material, data, and recommendations as soon as the G.V.S. & D.D. provides us with it. This is expected to take place within the next two months.

E E Olson

DIRECTOR ENGINEERING

EEO/WMR/ch