

Date: June 15, 1981

MEMORANDUM

TO: Mr. C.B. Martin
Supervisor
Air Resources Branch.

FROM: E. T. Barrow
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and Appraisal Section.
Air Resources Branch.

SUBJECT: Hooker Chemical Co's Incinerator Specifications

Whilst incineration of organic wastes is a completely acceptable method of disposal, providing that by-products such as hydrochloric acid and ash are adequately dealt with, careful design of the incinerator is essential.

The design indicated only by rough sketches in the attached documentation does not appear to meet the requirements for the destruction of hazardous wastes. Without design details and specific information about the fuel and waste nozzles, the fuel and waste composition and feed rates no full evaluation of the design can be made, however the following points must be considered.

1. Retention time: Retention times for the destruction of hazardous wastes are determined in specifically designed units. Transposition of the results to other designs must be carefully carried out. Generally laboratory results using small tubular plug flow reactors, heated to the desired degree by external means, are used to determine the times need to incinerate wastes. The waste and adequate air for combustion are usually premixed. For these reasons the degree of turbulence needed to maintain a well mixed gas is small, the variation in the retention times of molecules or small packets of gas is strictly limited. In the larger scale incineration units the variation (standard deviation) of retention times becomes much larger.

In the unit under consideration the flow pattern will allow a wide variation since the reactor shape and waste injection point allow the wastes to take a very short path to the reactor outlet bypassing much of the volume of the reactor. The turbulent

back mixing possible in such a design, where flow is reversed in the reactor, also increases the variation in residence times. Much of the waste can therefore escape more rapidly than calculations based on the reactor dimensions will indicate, and therefore escape undestroyed. The degree to which this will occur will be very dependent on the unit's operating conditions at any given time.

Under the conditions specified in the permit, dated 6/30/81, numbered 2017, for the incineration of organic chlorine at 2,400 lb/hr and greater than 30% chlorine (say 40%) the retention time will be considerably shorter, even utilizing the duct volume for combustion, than 2 seconds. If fuel is needed then even shorter residence times than 1 second could ensue. The requirement in the letter of October 1st 1979 for 5% free excess oxygen (ca. 25% excess air) reduces the residence to a considerable degree and demands additional fuel in order to maintain adequate incineration temperatures.

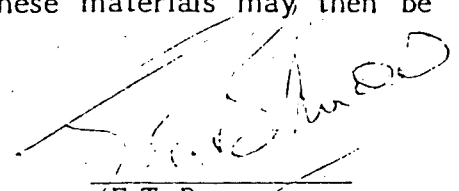
2. Temperature: The use of steam, compressed air and water in the waste feed system will not only reduce residence times but lead to lower temperatures, and the need for excess fuel. Measurement of the chamber temperatures may be a problem unless the measuring thermo couples are shielded from flame and hot wall radiation effects.

The charts, included in the submission, indicating calculated temperature and residence times are based on unknown data but indicate that temperatures of less than 1200°C are achieved only within the reactor and the first section of the exit duct, about two thirds of the available volume. The basis for the requirement of 1200°C is not known, but generally this temperature and a residence time of 1-2 seconds is considered to be needed for the incineration of the more hazardous organic materials such as dioxins and PCB's, and the higher value of 2 seconds was chosen for this installation (page I.31 para 6(a)).

Summary:

Without further information it is not possible to be sure that this incinerator can meet the requirements of para 6 in the Stipulation and Judgement.

However, it appears unlikely that at high rates of incineration of wastes para 6 (a) will be met. It is also probable that paragraph 6(d) requiring 99.99% destruction efficiency, will not be met unless the "principal components of waste" are readily combustible, possible carrying other more difficultly combustible and unmonitored materials in lesser amounts. Destruction of these materials may then be questionable.


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ETB/mb/ER3-4

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