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Douglas F. Golding
Regional Director

Balboa Pacific Corporation
2199 Allegheny Road
El Dorado Hills, California 95762

February 4, 2000

Dear Mr. Golding,

In response to our recent conversations, and after extensive research, I offer the following opinion regarding the chemical defoliant 'Agent Orange':

The chemical composition of 'Agent Orange' is typically described as "a 50:50 mixture of the n-butyl esters of 2,4-D ($C_{12}H_{15}Cl_2O_3$)¹ and 2,4,5-T ($C_6H_5Cl_3O_3$)^{1/2}". The reddish-brown to tan colored liquid is soluble in diesel fuel and organic solvents, but insoluble in water. For typical defoliant applications, agent orange would have been supplied by The Dow Chemical Company in pure form, diluted in diesel fuel, kerosene, or light fuel oil, and sprayed over the selected area.

The chemical composition of both compounds would be described as chlorinated hydrocarbons. Combined with the carrier of either diesel fuel, kerosene, or light fuel oil, the material is ideally suited for destruction by the Balboa Pacific Pyrolytic Thermo Oxidation process. Based on studies conducted by Dames and Moore the Balboa Pacific process is 99.999984 % effective for the destruction of dioxin, furans, PCB's and other chlorinated hydrocarbons. Because of the similar chemical structure an equally effective ratio of destruction would be expected with 'Agent Orange'.

Furthermore, based on the BTU content per pound of carrier liquid:

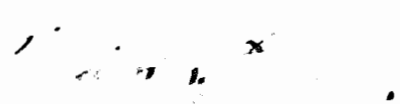
Diesel Fuel	19,200 BTU/pound ³
Kerosene	19,810 BTU/pound ³
Light Fuel Oil	18,835 BTU/pound ³

this material is ideally suited for a waste to energy system such as Balboa Pacific's. Because of the highly effective ratio of destruction, the by products of pyrolytic conversion and thermal oxidation would be water, carbon dioxide, and hydrochloric acid (retained in the hydro mist scrubber).

Finally, a particular note of caution should be expressed. 'Agent Orange' is defined as an "Extremely potent, low molecular weight toxin. This substance has been listed as a carcinogen by the EPA". Suitable methods of handling would be required.

I hope this information is helpful, if I can be of any further assistance, or provide any additional information, please do not hesitate to contact me at the address as referenced above.

Sincerely yours,



William L. Purnell, Ph.D., Ch.E.
Managing Partner

Informational References:

- ¹ The Merck Index - Tenth Edition - Merck & Co., Inc.
- ² Agent Orange and its associated dioxin: Assessment of a Controversy by A. L. Young and G. M. Reggiani - 1988 Elsevier Science Publishers
- ³ Handbook of Chemistry and Physics - Thirty-Fifth Edition - Chemical Rubber Publishing Co.