Appendix A

Midland's Petroleum Product and Chemical Inventory Usage Calculations

As part of my review of the opinions provided in Keith Baugher's Declaration, I calculated the rate of Midland's petroleum product and chemical inventory usage at the refinery following the sale to Hudson. In order to confirm the methodology used by Baugher, I utilized the same sources of information referenced in his Declaration to develop my calculations since I determined these sources were the most relevant for this evaluation.

Turnover Calculations

In paragraph 36 of his Declaration, Baugher addresses turnover and states that the percentage of Midland product concentration remaining in the various tanks over time after the refinery was purchased by Hudson is a function of the Ratio of Product Production to Volume in Tanks at the time of purchase. For example, 3 turnovers have occurred when that ratio equals 3. Based on his calculations, Baugher's Figure 6 shows that less than 0.1% of any vessel's content remains after 6 turnovers. Baugher makes the assumption that ideal mixing conditions occur in the tanks. I also assumed that this is a continuous process where the volume is constant and thus the rate of product entering the tanks is equal to the volume of product leaving the tanks. This is consistent with the Hudson Refining Company Refining Model (LOL0395352-63) showing that the total refinery input approximately equals the total refinery products and refinery fuel requirements. My calculations comparing the percent of Midland's product/chemical remaining in a tank to the number of tank turnovers show a similar reduction of Midland's product as depicted in Figure 6 of Baugher's Declaration. Based on my calculations, it takes seven turnovers before less than 0.1% of the Midland's product is remaining. This is a one turn-over higher than the six turnovers stated in Baugher's Declaration. The results of my calculations are depicted in my Figure A-1 below, which is similar to Baugher's Figure 6.

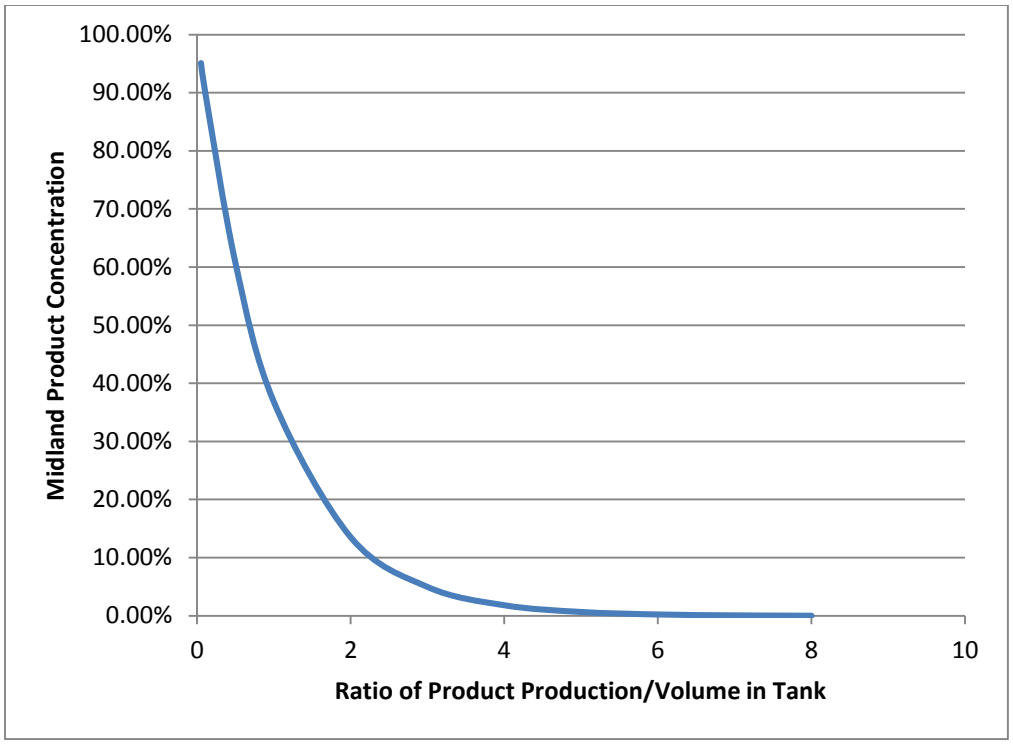

Figure A-1 Reduction in Midland product concentration as a function of turnovers

Displacement Calculations

To calculate the time required to displace Midland's petroleum products in the tanks (Table 1 in Baugher's deposition), the quantity of existing Midland's material (LOL0014092-3) at the time of the sale and production rates for the hydrocarbon classes (LOL0395352-63) were used in the model depicted in Figure A-1. For the Displacement of Midland Hydrocarbon, I calculated the number of days it took for the percent of remaining Midland's product to drop below 0.1%. The results of the calculations are presented in Table 1.

Table 1. Time Required to Displace Midland Crude and Products in Tankage

Hydrocarbon Classes	Displacement of Midland Hydrocarbons (Days)
Gasoline	5
Platformer Feed	26
Crude	114
Diesel	2
Alkylate	11
Gas Oil	1
Topped Crude No. 6 Fuel Oil	56

The results for each hydrocarbon class, except for crude, (1 to 56 days) are similar to those in Baugher's Declaration (20 to 49 days). The references used to obtain values of volume and production rates do not explicitly list values for these hydrocarbon classes; thus, assumptions were made on how to group the products into classes, which may explain the differences between my results and Baugher's for crude. The likely reason for the significant difference in days required to drop below 0.1% between my calculations for crude (114 days) and Baugher (22 days) is that I included the "raw" crude oil at the refinery. The other hydrocarbon classes addressed only have volumes for the material "in process". However, the crude oil has both "in process," "line field" and "raw" volumes. It is unclear from Baugher's Declaration what volume(s) were used in his calculations. My calculations utilized the total of all three volumes. The volume of barrels of "raw" crude oil (264,615.89) are an order of magnitude higher than the "in process" and "line field" volumes (40,225.25 and 1,446.00, respectively). If only "in process" and "line field" volumes of crude oil were used in the calculations, the number of days to displacement for crude oil (16 days) are more consistent with Baugher.

Similar to the calculations for the hydrocarbons, I obtained the volume and production rates for Hydrofluoric Acid, Caustic Potash, and Tetraethyl Lead (LOL0097910; EPAFOIA0016744-875; LOL0014092; LOL0395352-63; and Minutes of the Refinery Staff Meeting January 29, 1981 page 2) and calculated the number of months until the remaining concentration was less than 0.1% of its initial concentration. The results of these calculations are presented in Table 2

Table 2. Time Required to Displace Midland Chemical Inventory

Chemical	Displacement of Midland Hydrocarbons (Months)
Hydrofluoric Acid	12
Caustic Potash	31
TEL	17

Baugher stated in his Declaration that these chemicals were "reduced to less than 0.1% within 4 months after Hudson began operating the refinery." The results of my calculations differ from those of Baugher's by an order of magnitude ranging from 12 to 31 months before they were reduced to less than 0.1%.

Conclusions

While my calculations resulted in values different from those presented in Baugher's Declaration, the overall conclusions from these calculations are the same due to the length of time the refinery was operated after Hudson assumed ownership in February 1977. When Hudson shutdown the refinery operations in December 1982 (six years after Midland sold the facility), it is reasonable to expect given the turnover results of either calculation that no Midland products or chemical inventory existed at the refinery. Moreover, beyond the calculations, little if any Midland materials would have remained in inventory simply based upon turnarounds

performed for maintenance and repairs by Hudson after it purchased the refinery (at least two according to Wright (Wright Aff. ¶115) with Fuqua, Gaskins and Williams indicating that turnarounds were performed typically every two or three years (Fuqua Aff, ¶85, Gaskins Aff. ¶ 53. Williams Aff. 80).