SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

MEMORANDUM

DATE: June 3, 2004

FROM: Jill Whynot

TO: RECLAIM Working Group

SUBJECT: FCCU Control Cost Data

The attached FCCU control cost data and analysis is provided in response to an e-mail message from Ken Hudson, dated May 14, 2004 and AQMD's agreement to provide data to Working Group members at the May 11th meeting.

1. Source equipment description and size in mmbtu/hr:
   This is not provided due to the limited number of equipment and confidential nature of the data.

2. Emission Data:
   Emission reductions were based on emission factors in units of lbs NOx/1000 bbls fresh feed. Efficiency for SCR was assumed to be 80%. Emission reductions were calculated using throughput rates and uncontrolled minus controlled emission factors for the 2 in place FCC units that cost estimates were provided for. The average uncontrolled emissions for the 6 large refineries FCCUs are 0.26 tons/day. Again, due to the confidential nature of the data, mass emission rates are not provided.

3. Equipment Costs:
   The EPA Office of Air Quality Planning and Standards (OAQPS), Air Pollution Control Cost Manual (January 2002) assumptions were used in the cost effectiveness calculations. The OAQPS factor for retrofits includes costs for auxiliary equipment, handling and erection, piping, insulation, painting, site preparation, off-site facilities, engineering, designing, and lost production. It is uncertain if the OAQPS includes permitting costs, however these costs are negligible when compared to the overall capital investment. The OAQPS costs and the cost information supplied by the 2 refineries that installed SCR on their FCCUs compared favorably. These items are addressed in the notes and within the analysis on the attached spreadsheets. For more information on the OAQPS cost model, please refer to http://www.epa.gov/ttn/catc/products.html#cccinfo.

4. Operating Costs:
   These items are addressed in the notes and within the analysis on the attached spreadsheets. Annual costs include raw and maintenance materials, labor, utilities, waste treatment and disposal, replacement materials, overhead, property taxes, insurance, and administrative charges.

5. Financial Costs:
   The analysis was applied to a 10, 15 and 25 year project life, 4% interest rate and using the Discounted Cash Flow method.

   We will summarize and release cost and emission data for the other equipment requested in the near future. We look forward to receiving your control cost estimates for boilers and heaters and your input on other categories. If you have any further questions please call me at (909) 396-3104 or Gary Quinn at (909) 396-3121.

Attachment
JW:GQ:AK:CM