E CORRESPONDENCE

ATTACHMENT 7

DATE June 18, 1971

W. E. Lifson	REFERENCE
F. W. Church	SUBJECT Ambient and Emission Air Pollution Regulations

Attached is a memorandum on the probable impact on Esso Engineering designs in all U.S. jurisdictional areas of recent Federal legislative, regulatory, and directive actions for air pollution control. This report discusses in considerably more detail the data given at the June 9 Manager's meeting. The report is directed primarily toward Esso Engineering activities and does not cover the extensive impact on day-to-day plant operations.

Actions are proceeding at a head-long pace, particularly in regard to establishing source emission standards, and the attached report will need periodic revision. Information from EPA indicates that refineries and petrochemical plants will be among those industries scheduled next for new source emission standard setting. EPA wants to have these standards in effect before April 1972. In addition, each State is required to formulate within the next nine months an Implementation Plan which has to include emission standards and compliance timetables for existing sources.

F W Church

F. W. CHURCH

FWC:djb
Att.

cc: J. W. Brown
F. J. Feely, Jr.
R. E. Whall
All Senior Engineering Advisors and Senior Engineering Associates
All Division Managers
All General Managers
All Members of the Environmental Control Section
All Members of the Environmental Control Task Force

55392

Esso Engineering

TECHNOLOGY DEPARTMENT

June 18, 1971

ESSO RESEARCH AND ENGINEERING COMPANY

IMPACT OF AIR POLLUTION CONTROL REGULATIONS WITHIN U.S. AREAS

A number of legislative and regulatory actions both at State and Federal levels have been taken recently which could materially affect Esso Engineering and Humble operations. These actions have been concerned with both ambient and source emission standards with interlocking between separate actions. This memorandum will only consider those actions affecting stationary sources. Updating and refinement of the impact will be needed periodically since some actions are still pending or are in the process of being finalized.

Legislation And Regulations

Congress enacted the Clean Air Act of 1970, which went into effect on December 31, 1970, as Public Law 91-604. This Act incorporated a number of previously enacted laws as modified by the 1970 Clean Air Amendments. It essentially transfers standard setting to the Federal level through Federally established ambient air quality standards, new or modified existing source emission standards, hazardous substance emission standards, and approval or veto power on State implementation plans which are to include emission standards for existing sources. States can adopt more stringent standards—either ambient or emission. The Act established the Environmental Protection Agency, enabled the setting of regulations,, and provided a timetable for completion of the various phases of the program.

The completion timetable for stationary sources is shown in Figure No. 1. Each box represents an action point and the date listed on the right-hand edge applies. The first column details the timing schedule for new or modified existing sources. A modified existing source is defined as:

> "The term 'modification' means any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted."

EPA has published the list of source categories and has designated five major industries as the first group for development of emission standards. The industries are: sulfuric acid plants, nitric acid plants, steam generation facilities with greater than 250 million btu heat input per hour, cement plants, and municipal incinerators. Proposed emission standards on

these industries will be published in late July 1971 and promulgated in late October 1971. Sources in EPA indicate that refineries and petrochemical plants will be in the next grouping and it is EPA's intention to have emission standards on [new/modified] old sources in refineries promulgated by April 1972.

The second column of Figure No. 1 details the schedule for hazardous air pollutant emission standards. A hazardous air pollutant is defined as:

> "The term 'hazardous air pollutant' means an air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness."

EPA has published a notice on three materials on this basis which are: asbestos, beryllium, and mercury. Emission proposals on these are due September 27, 1971, with final promulgation on March 25, 1972, to be effective June 23, 1972. Additional materials will be covered in the same manner in the future with a corresponding time schedule based on date of first publication by EPA.

The third column of Figure No. 1 details the timing schedule involved for national air quality standards and State Implementation Plans which will cover, among many things, existing source emission standards, compliance schedules, permit systems, and monitoring requirements. EPA promulgated on April 30, 1971, ambient standards for six pollutants which apply to all U.S. jurisdictional areas. The six are: nitrogen oxides, carbon monoxide, particulates, photochemical oxidants, and non-methane hydrocarbons. Other pollutants will be added to the list from time to time by going through the same procedure. The official air quality standards are shown in Figure No. 2. Primary standards are based on health effects and secondary standards cover welfare aspects. The Act defines welfare as follows:

> "All language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being."

While these ambient standards are highly important, particularly in describing the "Priority Class" of an area, the main thrust on our operations will be from emission standards. The timetable gives the States nine months to formulate and submit the implementation plans and another four months for EPA approval or veto. The maximum of three years shown for compliance by the Act has been made more rigid by proposed Federal "guidelines" which have just recently been issued.

EPA issued on April 7, 1971, a proposed "guideline" to give the States assistance in preparing, adopting, and submitting implementation plans. These proposals were open for comment until April 28 but due to a delay in issuing the date was extended to May 12. API and Humble submitted comments, and Esso Engineering assisted Humble by furnishing our comments for incorporation. EPA will evaluate any comments received and then publish the official "guidelines" around the latter part of June.

The proposed guidelines are very comprehensive, complex, and present an extremely difficult and monumental task for the States. The areas covered include: administrative details, legal authority, control strategies, surveillance procedures, new source permit system, source registration details, necessary resources, categorization by present air concentrations and/or population density into Priority I, II, or III areas, and emergency action criteria. Eleven appendices are attached to the guidelines. Depending on what Priority area is involved, different compliance timetables, different degrees of control measures other than emission standards, and possibly different emission standards for existing sources could be involved. Unless an area of Priority III, which requires ambient air concentration levels to be under Secondary standards, is involved, emission standards for existing sources similar to those appearing in Appendix B of the guidelines will be required. Even Priority III areas will, however, require new or modified old sources to comply with emission standards which are based upon "The new source is designed, built, and equipped in accordance with the latest available control technology so as to reduce emissions to a minimum." Some differences in implementation plans between the various States will probably occur. EPA maintains approval or veto power and the opening sentence of Appendix B provides an insight. This reads: "These air pollution regulations include examples of the administrative provisions and pollutant emission limitations a State may need for an approvable implementation plan." Since a Priority III area will be hard to find and will not be conducive for the installation of an industrial facility, the emissions as specified in Appendix B will be somewhat generally applied to all manufacturing facilities.

Particulate
Emission Standards

The proposed emission standards for those existing sources of pertinence to Esso Engineering and Humble are shown in Figure No. 3. While not specifically stated, these standards are obviously based on current or near-future "best control" technology. There are some points involving strict applicability or extent in certain instances which will have to be resolved.

The limitations of 20% opacity (No. 2 Ringelmann) could easily become the controlling standard for a number of processes. Final emissions tend toward the smaller particle sizes simply because of the greater efficiency of collection of larger particles. Particles in the range of 0.1 to 6 microns are in the visible light wave length range and, therefore, are more effective in increasing opacity. A continuous opacity monitoring requirement

is directed at enforcing control during night-time hours. The three minutes in any 60 minutes at a No. 3 Ringelmann number probably require some different approaches to soot blowing operations such as increasing the frequency. Fluid cat units at Benicia, Bayway, and Baytown have been measured from 2 to 2.5 Ringelmann (30-35% opacity). Fluid cokers without some form of afterburner tend to have higher Ringelmann numbers.

The emission limitation of 0.1 lb/100 lbs of refuse burned in incinerators is approximately equivalent to 0.1 grains/SCF at 12% CO_2. The guidelines indicate that more restrictive requirements are feasible for large incinerators. Emission tests are to be conducted at the maximum burning capacity of the incinerator. Little or no stack test data is available in-house. Outside vendor and competitor data indicate two-stage scrubbing will be needed.

Fuel burning emission limitation on oil-firing is based on an ash content of approximately 0.05% which is considerably under most residual and bottoms oils fired in refineries. The Guidelines suggest an 80% control by either small-diameter cyclones or electrostatic precipitators. As cyclones of this type have an appreciable pressure drop, existing furnaces may not be able to accommodate the increased pressure. Of some considerable concern is the stipulation that the total heat input of all fuel burning units on a plant or premises shall be used for determining whether the heat input is over the 250 million Btu per hour stipulation. As written, the heat input from gas-fired units has to be included. Either a very low ash oil or using all gas firing will probably be needed if the installation of a collector is not incorporated. Current residual oil firing is about 0.08 lb per million Btu input. Emissions from firing bottoms or slurry oils is correspondingly greater.

Process particulate emission standards are based on the present L.A. codes where permissible emissions increase with increasing process weight throughput up to a maximum of 40 lb for a process with 60,000 or more lb/hr throughput. By the definition of particulate matter any condensible matter at ambient temperatures, excluding uncombined water, has to be included in the emission weight. Of additional concern here is the stipulation:

> "For purposes of this regulation, the total process weight from all similar process units at a plant or premises shall be used for determining the allowable emission of particulate matter that passes through a stack or stacks."

This implies that a refinery with two cat crackers would be limited to an emission level of 20 lbs/hr each. Very high efficiency, high energy scrubbers with some reheat to the effluent may be the indicated control. Current emissions vary from 300-700 lb/hr.

Fugitive dust is defined as: "Fugitive dust shall mean solid air borne particulate matter emitted from any source, other than a flue or stacks." Coke piles and catalyst handling are examples of concern. Several dust suppression techniques such as hoods, enclosures, oil or water application are suggested in the Guidelines. We have used silo storage for fluid coke product at Benicia.

Sulfur Oxides
Emission Standards

There is considerable confusion and some doubt as to whether or not these particular fuel combustion emission standards apply to refinery sources. The 0.1% sulfur content is for application to small area sources where fuel sulfur content is the only practical control method. The 0.3% sulfur oil and 0.7% sulfur coal are for power and steam generating facilities with a heat input greater than 250 million btu/hr, but the accompanying note states: "This language is intended for application to large fuel combustion sources where installation of flue gas cleaning systems is feasible." In any event, the standards are at least possible harbingers of impending refinery new source control standards.

The standards for fuel burning emissions are based on the availability of either low sulfur fuel, desulfurized oil or coal, gas, or flue gas desulfurization processes. It is recognized in the Guidelines that fuels of sufficiently low sulfur content will not be available in all areas and suggests adoption of phased schedules in these instances. It is stated "Technology now being demonstrated will allow 80 percent removal of sulfur oxides from combustion gases of most existing boilers. It is reasonable to expect that these processes will be improved in the near future and thus permit attainment of 90 percent or greater collection efficiency at a wide range of boilers." It can be seen that at 90% efficiency only a 3% wt S fuel can be burned to attain the 0.3% equivalency, at 95% efficiency, 6% can be burned and so on, and hence the suggested adoption of phased schedules. In order to burn high sulfur fuel, flue gas desulfurization will be needed or possibly gasification of all liquid fuels above 0.3% S with subsequent scrubbing are indicated control possibilities.

standard for process gas stream combustion is, however, specific refineries and appears in the same sub-paragraph as the above stand. Refinery make gas must meet this specification as well as coker off before it can be burned. This regulation also prohibits the venting or burning of streams containing over 10 gr H_2S/100 cuft. Scrubbing coker off gas before sending to CO furnaces and some improvement in MEA scrubbing efficiency are possible techniques. H_2S bearing streams have been burned at existing facilities under certain circumstances. Streams in this category will have to be scrubbed before sending to a flare. Current amine scrubbing facilities will need some improvement.

The standard given for sulfur plant emissions is a mixed unit in that it is in lbs of SO_2 per lb of S processed and hence a 99.5% efficiency recovery in lbs of S per lb of S processed is needed to get to the 0.01 lb of SO_2. The Guidelines state that commercial processes are being offered that are capable of the 99.5% efficiency. The use of the Stretford, Wellman-Lord, or Beavon sulfur plant off gas scrubbing processes are possible strategies to meet this very high efficiency.

Hydrocarbon
Emission Standards

The emission standards of Los Angeles County Air Pollution District are well known and do not need to be described here. What is of some importance is the interplay that may occur between ambient standards and ambient levels that will exist after the 1975 automobile emission standards are in effect. The official ambient air standard states: "The sole purpose of prescribing a hydrocarbon standard is to control photochemical oxidants." Hence, the ambient standard for hydrocarbons is only effective between 6 and 9 a.m. The Guideline's strategy plan calls for each State to make an estimation of HC, NO_2, and oxidant levels in an "example area" that would exist after 1975 automobile emission standards are achieved. If this area still would show a Priority I classification, additional measures must be undertaken. This includes such items as: conversion of motor vehicle fleets to LNG or LPG or similar action, reduce rush-hour motor vehicle traffic, expansion of mass transportation facilities, industry relocation, and land use restrictions. If a Priority I still exists, additional emission controls on refineries can be expected such as full vapor recovery systems or discontinuance of some operations between 6 and 9 a.m.

Carbon Monoxide
Emission Standards

The intent of the afterburner requirement and the stipulation that 1300°F for 0.3 seconds or greater is needed to reduce CO emissions from these refinery process sources to essentially zero. Tests on some of our CO boilers and furnaces show a range of 600-20,000 ppm of CO in the flue gas. Better mixing and an insurance of at least 0.3 seconds residence time in the direct flame will be needed in CO boiler designs. Also, the Guidelines require: "...an indicating pyrometer which is positioned in the working area at the operator's eye level." An R&D program has been proposed for 1972 to develop design parameters and operational modes. A high priority should be assigned to this project as well as an early completion date.

Nitrogen Oxide
Emission Standards

The combustion source standard of 0.3 lbs per million Btu heat input per hour is about equivalent to 200 ppm (as NO_2) by volume at 3% oxygen. The coal standard of 0.9 lb is roughly equivalent to 500 ppm. The Guidelines state that these levels are expected to be achieved by design and operation changes in firing boilers. The write-up only refers to boilers with a capacity of 250 million btu per hour or more and does not contain the same aggregate heat input requirement as was indicated under Particulates. There are reasonable expectations that this requirement can be met by studies now underway on refinery furnace design/operation changes except when burning heavy bottoms or pitch.

The nitric acid limitation of 5.8 lbs per ton of acid produced is a stringent interpretation of current available technology using abators to complete the breakdown of NO to elemental nitrogen.

Timetable
For Compliance

The Guidelines detail the method and time for compliance of all sources when Priority I or II area regions are involved.

> "Existing sources. All existing sources not in compliance as of the effective date of these regulations shall be in compliance within six months of the effective date of these regulations unless the owner or person responsible for the operation of the installation shall have submitted to the Director in a form and manner satisfactory to him, a control plan and schedule for achieving compliance, such plan and schedule to contain a date on or before which full compliance will be attained, and such other information as the Director may require. If approved by the Director, such date will be the date on which the person shall comply. ...In no event shall the control plan and schedule exceed three years from the adopted date of these regulations."

If no slippage in the completion schedule as shown in Figure No. 1 occurs, the date of compliance or submission of a control plan will be November 24, 1972. Periodic reports on progress will be required. In order to bring sources into compliance or provide a control strategy, Esso Engineering will probably have an avalanche of requests for assistance. Time is short!!

There are two mechanisms provided in the Act which could delay somewhat either the effective date of a given State's implementation plan for secondary standards or the compliance date for an existing source to a particular primary standard requirement. The Administrator of EPA may extend the period for submission of any State's plan or portion thereof which implements a national secondary ambient air quality standard for a period not to exceed 18 months. The EPA administrator may under special circumstances and rather complex interlocking procedures extend the maximum three-year period for compliance for individual specific sources for not more than an additional two years or he may postpone the compliance date of a given class of sources for a period not to exceed one year. The main reason for these latter deferrals has to be:

> "...such source (or class) is unable to comply with such requirement because the necessary technology or other alternative methods of control are not available or have not been available for a sufficient period of time."

Permit System

Construction permits for all new or modified sources will be required. The Guidelines are very detailed on what information is needed on an application and we will have to be prepared to furnish this information at an early date of project development. This will require a careful examination of any possible emissions and their levels, plus proper selection of the "latest available" control technology in order to have assurance that control efficiencies will be attained. This latter point is very important in that an operating permit will also be required which will only

be issued after determining whether construction permit details are fulfilled.

Monitoring Requirements

The plant will have to routinely monitor sources, keep records, and report findings. At the present moment which particular sources will fall under this requirement are not known with any degree of precision. Selection of proper instrumentation which can accomplish this routine monitoring and meet regulation requirements, design and selection of sampling ports, data reduction systems, and provision of an adequate and safe access to each port will be areas where Esso Engineering will have to take part.

F. W. CHURCH

FWC:djb

Enactment of Legislation - December 31, 1970

Stds. of Performance MOD/New Sources	All Sources Hazardous Pollutants	National A/Q Stds. And Existing Sources	Deadline Date
		30d	
		Issuance of Proposed National A/Q Stds.	1/30/71
90d	90d	90d	
List of Source Categories 30 Major Industries	List of Hazardous Pollutants		3/31/71
120d	180d	Promulgation of National A/Q Stds.	4/30/71
Proposed Regulations			7/29/71
90d		270d	
	Proposed Regulations		9/27/71
	30d		
Promulgate Regulations And Enforce	Public Hearings		10/27/71
Compliance Mandatory	150d	States Submit Implementation Plans	1/25/72
		120d	
	Promulgate Regulations		3/25/72
	90d	Fed. Approval of St. Implementation Plans	5/24/72
	Stds. Effective	Required monitoring effective about time of plans approval.	6/23/72
	Compliance Mandatory	Up to 3 years for control compliance.*	

*More rigid stipulations are detailed in proposed Guidelines.

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PROPRIETARY INFORMATION
For Authorized Company Use Only

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HYDROTREATING & FLUID SOLIDS PROCESSES DIVISION
J. W. BROWN . . . . . SR. ENGR. ASSOC.
CABLE: ENGRESSO, N.Y.

#55392 July 14, 1971

Messrs. F. W. Church - ERE
R. J. Fitzgerald - Humble-Bayway
S. J. Jeffords - Humble-Baytown
J. W. Matthews - Humble-Benicia
A. A. M. Patton - Imperial Oil Engineering Division, Sarnia
L. M. Williams - Humble-Baton Rouge

Gentlemen:

Attached is a summary of the meeting of the HRTC Task Force on Catalytic Cracker Stack Emissions, which was held at Florham Park, New Jersey on June 30, 1971.

Very truly yours,

J. W. Brown

Chairman

HRTC Task Force on Catalytic
Cracker Stack Emissions

JWB/ehl
Attachment - all copies

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cc: HRTC Committee Members
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R. W. Haddock - Baton Rouge
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MEETING OF THE HRTC TASK FORCE ON CATALYTIC CRACKER STACK EMISSIONS

June 30, 1971
Florham Park, New Jersey

A meeting of the HRTC Task Force on Catalytic Cracker Stack Emissions was held on June 30 at Florham Park, New Jersey. The attendance list is attached. This memorandum summarizes the information which was presented and the conclusions which were reached.

SUMMARY

Data on catalytic cracker stack emissions at four refineries have shown that it will be necessary to reduce particulate, SO_2 and carbon monoxide emissions in most locations in order to meet the anticipated regulations based on the recent recommendations of the Environmental Protection Agency. The range of data on stack emissions is compared with the anticipated targets in the following tabulation:

Cat. Stack Emission	Range of Measurements at Four Locations	Target (Approximate)
Particulate, #/Hr.		
- By dry collection	70 - 1,000	30 max.
- By wet collection	100 - 1,250	
SO_2, vppm	20 - 325	150 max.
CO, vppm	200 - 25,000	500 max.
Stack Plume Opacity		
% Light Transmission	<60	80 min.

While it is too early to determine exactly what limits will be set by the states, it is necessary to be prepared to meet the indicated targets. This includes the possibility that a wet collection method would be used for determining particulate emissions which would result in higher indicated losses, as shown in the above table.

The available control measures for particulate and SO_2 emissions are:

- Stack gas scrubbing for sulfur and particulate.
- Catalytic cracker feed hydrofining for sulfur and electrostatic precipitation for catalyst.

A preliminary cost comparison of these two routes is urgently needed to determine where future effort should be directed.

In regard to the stack gas scrubbing route, a rough cost estimate is being prepared by ERE for Benicia. This will be used by other refineries to assess the economics of scrubbing. Baton Rouge are planning to conduct a small scale scrubbing test to obtain data on pressure drop requirements and water quality.

In regard to the hydrofining/ESP alternate, the necessary data on electrostatic precipitator cost and performance are available from Benicia. The cost of the hydrofining step will depend upon the severity of hydrofining required for control of sulfur emissions, and a test program is going forward to obtain the necessary data.

Data from Benicia and Baytown indicate that satisfactory control of carbon monoxide emissions can be obtained by efficient combustion in the CO furnace. Refineries with high levels of carbon monoxide in the stack gas should compare their operations with those at Benicia and Baytown to determine whether changes in operating conditions or furnace modifications are required.

We still need a better method for predicting the effect of particulate control measures on stack plume opacity. ERE have identified very fine catalyst dust as the cause of stack plume opacity at Benicia. Data will be obtained at other plants to firm up the predicted effect of particulate emission rates on stack opacity.

ANALYSIS OF STACK EMISSIONS

Attachment 1 gives a summary of preliminary data on critical emissions from catalytic cracking plants at four locations. Additional details will be found in Attachment 2 (Bayway), Attachment 3 (Baytown), and Attachment 4 (Benicia). In each case, the particulate emissions are considerably higher than the predicted 30-40 lbs/hr future requirements and the wet collection method gives higher results by as much as 400 lbs/hr. A preliminary version of the Environmental Protection Agency's recommended test method is given in Attachment 5 and involves wet collection. We need to be prepared for the possibility that this test will be adopted by the states.

The plot of "condensable" particulates versus "dry" particulates shown in Attachment 4 suggests that some of these particulates are produced by the test method. It is important that future testing should follow the proposed EPA procedure (Attachment 5) as closely as possible. Analysis of the "condensable" particulates at Benicia showed that they are mainly H_2SO_4, which can be controlled either by cat feed hydrofining or scrubbing.

SO_2 emissions vary from 20 ppm to 325 ppm versus an approximate target of 150 ppm maximum.

CO emissions are as high as 25,000 ppm which is excessive in view of the demonstrated low levels at other refineries. The Environmental Protection Agency has not recommended a CO emission limit, except that available technology will dictate a level in the neighborhood of 500 ppm maximum.

PREDICTION OF STACK PLUME OPACITY

ERE is developing a method for predicting the effect of particulate loading on stack opacity. A preliminary prediction for Benicia is shown in Figure 2 of Attachment 6. ERE have established that the cause of stack plume opacity at Benicia is very fine catalyst dust which has been identified by optical and electron microscope inspection. It is possible that catalyst losses will have to be even lower than 40 lbs/hr in some units to meet the requirements of 80% light transmission or Ringelmann #1.

It is urgent that this method of prediction should be verified by including data from other catalytic cracking plants. ERE will advise each refinery of the data required and method of data collection.

OUTLOOK FOR AIR POLLUTION REGULATIONS

Attachment 7 summarizes the status and outlook for air pollution control regulations within the United States, based on the Environmental Protection Agency's recommended implementation plans. The states have until May, 1972 to establish regulations for existing sources and therefore it is too early to determine exactly what regulations will be adopted by the various states at that time. In addition, the outlook is for even more restrictive regulations based on:

- The EPA's anticipated standards for new or modified refinery sources.

- Anticipated limitations on emissions of "hazardous air pollutants" for which no ambient air quality standard is applicable.
- Secondary standards covering welfare and general well-being.

Therefore, it is desirable to avoid making commitments on control measures if possible until future regulations are better defined. Meanwhile it would be desirable for each refinery to analyze catalytic cracker stack samples for trace impurities, such as mercury, beryllium, cadmium, lead, polynuclear aromatics and other toxic compounds during the course of routine stack sampling.

STATUS OF CONTROL MEASURES

The available technology for control of particulate, sulfur and carbon monoxide emissions is illustrated on a generalized basis in Attachment 8. There are basically two routes:

- Stack gas scrubbing for sulfur and particulate,

or

- Catalytic cracker feed hydrofining for sulfur and electrostatic precipitation for catalyst.

A CO boiler or furnace is required in each case. Particulate and sulfur emissions are clorely related because sulfur contributes to particulate emissions in addition to being regulated separately.

An economic comparison of the available control measures is urgently needed to determine where future effort should be directed. For Cases A and C which involve hydrofining of the cat feed, it will be necessary to establish the required severity of hydrofining and its effect on catalytic cracker yields and product quality. In Case B which involves scrubbing, some test work will be required to obtain a design basis. Thus in all cases, some additional test work will be required to firm up the cost comparison and provide a design basis. Plans for evaluation of these alternates are described below.

- Stack Gas Scrubbing

Esso Engineering is preparing a rough cost estimate for lime/water scrubbing of catalytic cracker stack gas for Benicia. The results are expected to be available by the end of July. This information will be transmitted

EMERGING TECHNOLOGY

Emerging technology offers the possibility of lower cost or improved efficiency relative to the control methods which have been previously discussed provided it can be demonstrated in time to meet air pollution requirements.

The Ducon sand filter development offers the possibility of improved collection efficiency as compared to electrostatic precipitators. This could be quite important for catalyst dust control. Baytown and ERE are evaluating this new technology. A test unit has been shipped to Baytown where it will be tested on a slipstream from the catalytic cracker.

Wet electrostatic precipitation offers the possibility of matching wet scrubbing in efficiency without the high pressure drop debit of a high energy scrubber. Baytown reported an interesting contact with the Micropul Company who claim to have experience in particulate and sulfur control in the aluminum industry. This will be followed up by ERE.

Possibilities for control of catalyst losses with new catalysts are not encouraging, so far. However, another meeting with Davison is scheduled in July, 1971. Baton Rouge Esso Labs. made some small scale tests to investigate the "explosion" theory that catalyst losses are aggravated by addition of fresh catalyst to the hot regenerator. Results were discouraging in that no significant difference in catalyst decrepitation was noted for various rates of heating. This will be documented separately by Baton Rouge - Esso Research Laboratories.

INDUSTRY ACTIVITY

Industry contacts have shown that our competitors are evaluating the same control measures which we are studying, but there are no definite plans for installation of control equipment other than electrostatic precipitators. In California where current regulations require immediate action, the indications are that refineries will rely on electrostatic precipitators to meet current regulations while awaiting a better definition of the long range requirements.

OUTLOOK

It is expected that preliminary evaluation of control measures will be available from each refinery toward the end of August, at which time another Task Force meeting should be held to make plans for firming up the results.

J. W. BROWN, Chairman
HRTC Task Force on Catalytic Cracker
Stack Emissions

JWB/ehl
Attachments

July 14, 1971

ATTENDANCE LIST

MEETING OF NRTC TASK FORCE
on
CATALYTIC CRACKER STACK EMISSIONS

June 30, 1971
Florham Park, New Jersey

Name	Affiliation
J. W. Brown, Chairman	ERE - Florham Park
F. W. Church	ERE - Florham Park
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R. J. Fitzgerald	Humble - Bayway
J. S. Halow	ERE - Florham Park
S. J. Jaffords	Humble - Baytown
R. G. Kunz	ERE - Florham Park
R. J. Levy	ERE - Florham Park
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A. A. M. Patton	Imperial (Eng. Div.) - Sarnia
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