

CONFERENCE OVERVIEW

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I do not intend to summarize the very excellent presentations that were prepared by each of the authors and which you have heard during the course of this conference. Those presentations will be included as part of the written proceedings of the conference. There simply will not be enough time to cover them as part of this overview.

At the beginning of this conference, I asked each of the panel leaders and other selected participants in the conference to provide me with input from their particular session. I then planned to assemble their data in a matrix-like fashion and report it to you as an unbiased consensus. Instead of receiving this information in an orderly manner as each session was completed, I received an information explosion all at once just a few minutes ago. It has thus been impossible to assimilate all of the data in time to give it to you at this final session. I shall nevertheless attempt to follow through with the plans I had made initially, but I shall ask for your participation and corrections in helping to make this overview the kind of consensus that was intended.

First, let me reemphasize by means of this first viewgraph (Figure 1) that the first and primary objective of the conference has been to discuss the status of synfuels R&D on alternative fuels for transportation. This viewgraph also shows the "influence of nontechnical factors . . ." as an objective of the conference. This particular objective was not included in our original conference plan. It nonetheless emerged as an objective by many of the people at this conference and has therefore become an objective-in-retrospect. The term "nontechnical" as applied to this conference relates to influences by special interest groups and various institutional issues. Even national economic security and political developments fit into this category. There was also a session to allow discussion on the Army's new hybrid fire-safe fuel (FSF) composition. This session was arbitrarily fitted into the conference and was not considered to be a specific part of the conference agenda. But many of you requested a report by the Army and

SwRI on this fuel, and so it was added in response to demands. Finally, the end-application of this conference has been to identify adjustments that may be needed in (1) AFUP strategies, (2) AFUP projects and (3) in related industry and government R&D activities.

This next viewgraph (Figure 2) is intended to matrixize the entire conference. You can observe that the three basic discussion items (status of R&D, nontechnical factors, and the Army's fire-safe fuel) have been segregated according to discussion origin, i.e., federal, military, industry, and university. The viewgraph also allows space for a listing of recommended adjustments to the AFUP and other related programs. I shall use this viewgraph as a format for the remainder of this overview.

Please note, initially, that I have assessed the level of interest (or volume of discussion) that occurred during each session on each discussion subject. I hope you will agree that the "status of R&D" received a generally high level of interest at all sessions. Discussion of "nontechnical factors" varied from extremely high at the federal session (and at both workshops) to quite low at the military and university sessions. Since the hybrid fuel was discussed at a single session, the high, low, and medium ratings shown pertain to the levels of interest shown by the attendance during the discussion following the prepared parts of the session.

It is now appropriate to comment briefly on the discussion that ensued during each of the sessions. I shall comment first on the "status of R&D" as indicated on the viewgraph.

The AFUP program as presented by Ralph Fleming was fairly well defined. I think the discussion on this program from the floor as well as from private conversations indicates that it had been well planned.

The military status of R&D was discussed. The Navy, Air Force, and Army elements of the DOD now have well-defined and well-coordinated alternative fuel programs. A thorough presentation

CONFERENCE OBJECTIVES

TO DISCUSS --

- STATUS OF R&D ON ALTERNATIVE FUELS FOR TRANSPORTATION
- INFLUENCE OF NON-TECHNICAL FACTORS ON DEVELOPMENT OF ALTERNATIVE FUELS
- HYBRID FSF EMULSIONS

TO IDENTIFY ADJUSTMENTS THAT MAY BE NEEDED IN --

- AFUP STRATEGIES
- AFUP PROJECTS
- RELATED INDUSTRY AND GOVERNMENT R&D

Figure 1

CONFERENCE OVERVIEW

SUMMARY OF DISCUSSION

	FEDERAL	MILITARY	INDUSTRY	UNIVERSITY
STATUS OF R&D	HIGH	HIGH	HIGH	MEDIUM
NON-TECH FACTORS	HIGH	LOW	MEDIUM	LOW
HYBRID FSF	LOW	LOW	HIGH	MEDIUM

SUMMARY OF ADJUSTMENTS NEEDED

AFUP STRATEGIES	AFUP PROJECTS	RELATED PROGRAMS
SEVERAL	SEVERAL	SEVERAL

Figure 2

was given on the military program to evaluate and utilize specification fuels from oil shale. The military emphasized that this DOD energy program was *not* designed to establish an economic basis for a commercial shale refinery but rather to establish the technical feasibility of producing specification quality diesel and jet fuels from oil shale. Industry response to this military session of the conference was quite varied. However, the majority of the response was extremely complimentary. The point was made several times during the conference that *here* is a government agency that has made a decision! They have selected an energy source and the alternative fuels they expect to make from it. At least, they know where they are going and they have said what their program stands for. This statement certainly cannot be made about the activities related to the national energy plan which were criticized severely.

The most critical of the statements overheard on the military program was that the testing of large volumes of finished products from oil shale deposits is a pointless exercise as the products are not representative of finished quality from real commercial processes. Therefore, the program is an excessive exercise in testing because whatever the results, they are *not* representative of finished products when the processes progress into commercial proportions at some later date. But, regardless of that particular criticism, the general attitude of the attendance was quite complimentary about the military's energy program.

Now for industry! One of the interesting initial comments during the industry presentation was a report with rather good confidence that the stratified charge engine will soon be marketed. Of course, the stratified charge engines are already apparent in some of the imports. The first of the American-made stratified charge engines to be marketed is likely to be the Ford PROCOC. There were nods from various people in the automotive industry which indicated agreement with this statement. Whether stratified or not, future spark ignition engines promise to have less stringent fuel property requirements in terms of volatility and octane number, indicating to some extent, a relaxation in fuel specifications. That trend, however, will not ease the fuel property requirements for other vehicles that are on the road today that must be satisfied with more stringent fuel specifications

for some years to come.

Another significant event during this industry session was a proposal by a member of the petroleum industry that referee grade synfuels should now be formulated. Fuels having an unspecified IBP and a 700°F end point were suggested as feasible fuels from either shale or coal. This boiling range was proposed as the most economic liquid product that can be produced from either oil shale or coal, and as referee fuels, they should be produced without regard to present day engine requirements. This was a very interesting proposal because it represents, perhaps, the start of synfuel specifications—specifications that may well be the forerunners of future nonpetroleum fuel specifications. Indeed, this was a very interesting proposition.

Another comment that was well received was a statement that catalyst processes for the synfuels industry are mature and ready to go. Catalyst suppliers need only some guidance as to which industries to go to and which product to produce. The point was also made that most of the processes known for use in the production of synfuels are ready and need little or no additional development.

During this conference, people working with alternate energy sources presented and defended some interesting physical and chemical performance data on the properties of products from oil shale. This information is certainly bound to be useful. For example, the data imply that mid-boiling distillates from oil shale are now technically feasible. However, the time required for these distillates to reach economic parity with petroleum products was not revealed and was inadequately discussed. The fact remains that economic parity, not technical feasibility, is the barrier to production status for synfuels.

Let me now mention alternative fuels from coal as interpreted at the industry session. The coal-derived fuels were designated as somewhat less viable than alternative fuels from oil shale. But, keep in mind that this conclusion could be due, perhaps, to the attendance at this conference which appears to be more committed to oil shale than to coal. We really did not hear adequately from the advocates of coal liquids. We heard from some, but not to the extent that we heard from the oil shale advocates.

Another output of this session was the proposition for a more extensive and better coordinated interchange among the military (as users), engine manufacturers, and the processors with regard to the testing and availability of fuels from oil shale. There was extensive discussion during the workshops about the availability of oil shale products for testing and about the value of the tests. Some people expressed eagerness to test any of the available synfuels along with frustration that none was available, while others seemed to feel that a review of the physical and chemical properties would be sufficient until full-scale operational processes are selected.

From the universities, reports were given by Purdue, University of Missouri at Rolla, Santa Clara University, Penn State University, and the University of Wisconsin. Most of the activity during the University session is documented by preprints which will become a part of the published proceedings. I shall therefore omit a summary of each of these very fine presentations in the interest of time and proceed with a summary of the nontechnical factors which influence the availability of alternative fuels.

The major item of discussion relating to nontechnical factors during the federal session pertained to communications. As technical people, we in industry as well as in government service, tend to be talking to ourselves at conferences such as these, and we desperately need a communications mechanism that can reach Congress. We even need a way to reach the higher DOE offices. The communications problem is an incredible one! We know what needs to be done to accelerate the availability of alternate fuels, and we can also find agreement among us on ways to go. But the feeling seems to prevail that our conclusions and outputs will not go beyond this room or at least beyond the DOE sponsor of this conference. This is a statement of the problem.

Although we seemed quite able at this conference to state the problem with regard to communications, we were unable to agree on the means that should be taken to minimize the problem. Several suggestions were made ranging from writing your Congressman to knocking on the President's door. Going to the top offices of DOE was also suggested. A rather strong proposition was made to establish a new nonprofit organization

which would report directly to congressional aides on the status of synfuels R&D. Several other comparable suggestions were made. I am hopeful that we in the technical public can actually come to grips with this communications problem and formulate a way toward effective communications. Please give thought to this problem even after we adjourn the conference as it is a serious one. This feeling was evident throughout the conference.

The nontechnical factors were not a prolific discussion item during the military session. How the military avoided a critique on communications, I do not know, but they did it.

The industry session entertained prolific discussion on several of the nontechnical factors. Perhaps I should have given this session a "high" rather than a "medium" rating on their level of discussion intensity. The industry discussion of nontechnical factors was more difficult to assess, however, because they were mixed with the technical R&D factors. For example, statements were made that the efficiency of the nominal petroleum refinery is best when the mid-distillate product demands do not exceed 25 percent or so of the total product outputs. The petroleum industry points out that the military, air transportation industry, industrial users of heating fuels, and now, even automobiles are increasing their use of the middle distillate fraction. This trend is conflicting with national objectives to conserve energy at the refinery. It conflicts because typical crude runs using straight run processes generally give the most economic and most efficient yields. Straight runs generally seldom yield more than 25 percent middle distillates, and outputs beyond this figure require additional stream processing. Each additional process requirement tends to reduce yields and increase costs. At any rate, the nontechnical demand problem is certainly causing some corresponding technical effects—thus influencing the status of petroleum as well as synfuels R&D.

During this session, a recommendation was made that synfuels be utilized first in stationary engines followed by the involvement of synfuels into the transportation industry. The rationale behind this recommendation was that stationary engines consume less energy as a use sector and also can accommodate a wider range of fuel properties.

An announcement was made that a donor

solvent process is now under pilot plant construction, and that plans are being made to build a 30-to 40-thousand barrel per day full-scale plant at some later date. However, the full-scale plant is quite a number of years away, and no estimate was made on the time when the full-scale facility using the donor process will be available.

A proposition was made during the last workshop that much smaller cars should be forced onto the United States highways as a means of conserving energy. Such force could be developed through even more severe emissions legislation—legislation which small cars could cope with but with which large cars could not.

During the university discussions, a statement was made that there is an undesirable psychological influence that accompanies the development of synfuels. There seems to be a public feeling that the future necessity to use synfuels is a necessity to pay more for something that is worse. In defense of our national technology base, the proposition was offered that we should not think this way. We have abundant alternative energy sources in coal and oil shale, and we should direct our thinking to seeking alternative fuels that may cost more but that also perform better.

This completes my summary of the discussion, and I shall now report briefly on the adjustments needed in the AFUP and other related programs. First, with regard to AFUP strategies: Please recall that the original national energy plan (that is now only about 18 months old) called for near-, mid-, and far-term strategies. For some unknown reasons, there do not appear to be any more midterm strategies. We now hear only about near- and far-term strategies. What happened to midterm? A recommendation is made that it be dropped from use and merged with near term.

Although a minor item, a recommendation has been made that future conferences such as this will be assisted by knowledge of ongoing DOE programs. These programs should be summarized by titles and perhaps even costs. Such information will be conducive to better recommendations on changes or improvements that should be made in the AFUP.

Probably the key adjustment that might now be made in the alternative fuels program would be to consider and plan referee fuel specifications that would be used to guide research and development

on future engines for transportation. The dialogue that went on during this conference more than justifies this adjustment. You may prefer to broaden this project recommendation to include the development of referee compositions that include blends of synfuel components with petroleum components as a near-term reference fuel. Such fuels do appear likely to emerge. If not, it is almost certain that syncrude stocks will be blended with petroleum stocks prior to refining. Perhaps the first project adjustment should begin by first concluding that sufficient progress has been made toward development of alternative fuels to justify the definition and formulation of referee fuels. Second, a study should be made to establish which referee fuels are now feasible to formulate. Then initiate work to formulate, specify, and produce the fuels. The automotive industry does indeed need to have better guidance on what future fuels to shoot for, and this project adjustment would satisfy that need.

Now, with regard to recommendations for and by the universities. Studies into the chemistry of particulate formation and the effects of these particulate formations on atmospheric quality was recommended by a number of attendees at this conference.

Polynuclear aromatic hydrocarbon emissions were also included in the hopper of recommendations for university research. These chemicals need the same kind of fundamental attention that is needed for particulates. Recommendations were also made that the universities give more attention to the identification, influence, and inhibition of nitrogen compounds, oxygenated compounds, and various metallic elements that are expected to be present in nonpetroleum fuel products.

I also recall some discussion culminating in a recommendation that university research programs on combustion give more emphasis to the chemical kinetics of combustion without sacrificing the present level of effort on the macrothermodynamic combustion projects that are in progress at this time.

The recommendations by industry for adjustments in their own energy programs were minor—and so might it be expected. But one discrepancy within industry is obvious. Interaction and better coordination are needed among the automotive, petroleum, and especially the nonpetroleum

energy industries. Such interaction will aid development of the much discussed engine-fuel systems. Such interaction will also help to better establish those tradeoffs that are absolutely essential between the fuel requirements for engine and the fuel production possibilities. Do not depend on the government to coordinate all of the industry activities. Industry certainly *should* be able to establish this coordination without government aid.

One of the more specific suggestions that impacts on the AFUP was to (1) review present synfuel processes, (2) evaluate the process options, (3) select a process, and (4) build a commercial-size plant. This can be done *now*, but only if its operation is subsidized. The technology exists, the economics do not. It is inevitable that such plants must be constructed. It's urgent that they be constructed soon. It's essential that the construction as well as the operation of the initial plants be underwritten. Otherwise, they will not be built. This recommendation, it should be noted, grew out of a more critical and nebulous recommendation that adjustments are crucially needed at congressional or federal administrative levels to correct the irony of stated objectives to accelerate the development of alternative fuels and corresponding federal actions (and inactions) which retard and block these objectives.

This completes my rather uncoordinated overview of the conference—an overview which is supposed to end at 11:30. I should now ask if you feel that this overview should be adjusted or corrected. No doubt I have omitted some of the important proceedings, and I apologize for not allowing sufficient time for your finishing comments. There now appears to be only time enough for some closing remarks.

The first closing remark should be with regard to the proceedings that are going to come from this conference. We are going to paraphrase the proceedings of this conference without reference to specific persons or their companies. We expect to have them completed within about two months and will mail them to you. The mailing will follow our submission of the proceedings to Gene Ecklund who will review and approve them. I cannot advise you on distribution beyond the present attendance because we have not yet determined if the proceedings will be given an official DOE cover. If so, wider distribution and purchase by

nonattendees will follow.

I would like this opportunity to say to the panelists, the session leaders, and the authors, that your contributions have been the mainframe of the conference. Your preprints have been the documents that have stimulated the discussion and provided the backbone for this conference. I apologize, again, for my failure to cover your written material during this overview because there were some valuable and well-phrased thoughts expressed by all of the authors. Thank you very much for taking part in this conference and for making it as useful as you have.

I want to note that the conference was planned by Southwest Research and jointly sponsored by DOE and SwRI. The guidance and the positive attitude that came from Gene Ecklund and Ralph Fleming during the planning of this conference are deeply appreciated.

I should also note that the arrangements were made by the Public Relations Department of Southwest Research Institute. The Public Relations people involved were Jack Harmon, Dave Black, Thelma Greene, and Bea Moreno. They were assisted by the San Antonio Convention and Visitors Bureau, through Mrs. Alice Elizondo whom you have seen at the reception desk along with Thelma Greene and my secretary, Mrs. Rebecca Sears, who is the most tolerant person I have known and perhaps the world's greatest psychologist.

The audio and visual effects are normally not mentioned, but you may recall that there has not been a single problem with any of the audio equipment. Likewise, all the projectors worked well—the movies as well as the stills. That performance is really unprecedented. This service was provided by contract with AVW AudioVisual, Inc. It is managed by Craig Harris and the man behind the console is Gene Escobedo. We have been very pleased with their efforts.

Finally, I would say that this program was produced and directed by John Russell. John Russell, of course, works with me at Southwest Research Institute and so, while it may not be in good taste to express thanks to your own people, at times like these I will say at least that I have admired the manner in which John produced and directed this show.

And finally, I would like to thank you people

very much for your patience. The key to any successful conference is the participation by the people who have come. You have been very attentive. You have been agreeable, and you have been crit-

ical. You have been a very fine audience, and I thank you very much for coming and hope that we can do this again sometime. Thank you.