UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

January 10, 1980

OFFICE OF THE
ADMINISTRATOR

The Honorable Douglas M. Costle
Administrator
U. S. Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Costle:

This letter constitutes the report of the Research Outlook Review Subcommittee of your Science Advisory Board. The Subcommittee, drawn from the Science Advisory Board to represent a broad cross-section of expertise in research areas of importance to EPA, was to review and provide comments on Research Outlook 1980. Our report includes those items about which members of the Subcommittee felt most strongly. A list of Subcommittee members is attached as Tab A, and comments by individual members are attached as Tabs B through G. For the most part, individual comments enlarge upon points made in our Subcommittee report.

The Subcommittee is mindful that its role is to review and provide comments on Research Outlook 1980 prepared by the Office of Research and Development, not to participate in the research planning upon which the report is based. It would be most appropriate for a subcommittee to conduct its review of the document after its completion but prior to its submission to the Congress. Unfortunately, the very short interval between completion of the document and its submission makes this approach impractical for review of a document as extensive as Research Outlook 1980. The Subcommittee, therefore, met on November 19, 1979, to review the first draft and on December 18 to review a revised draft of the report. Although comments made by the Subcommittee and its members may have been incorporated in the report, the Subcommittee does not consider that it participated in the research planning process but only in the plan's presentation.

The Subcommittee considers Research Outlook 1980 as a substantial improvement over earlier Research Outlooks. Earlier Outlooks gave little evidence of research planning -- this Outlook does. Research Outlook 1980 reflects the work of Research Committees made up of members of ORD and relevant program offices. The active participation of users of research results in the research planning process has almost certainly made the planned research much more

responsive to needs of the regulatory arm of the Agency. Perceived lack of responsiveness to program office needs has been a chronic problem for ORD since EPA was formed, and this planning process should go far toward improving the relationships between ORD and the rest of the Agency. On the other hand, the use of the Research Committees does result in increased compartmentalization and in concentration on solving near-term problems. The Research Outlook primarily treats the research issues as separable problems -- in air, in water, on land. There is some departure from this narrow approach in the sections, Toxic Substances, Energy, and Anticipating Environmental Problems.

We believe that it is necessary to adopt a more broadly based view of the research needs on environmental issues. Such a broader view would consider the multimedia aspects of the problems; would identify interactions between media; would set priorities to deal with the urgent problems in order; and, finally, would identify research necessary to quantify trade-offs between media.

This need has been recognized in the current Research Outlook. To quote from the document:

> "Since there is no 'free dumping ground' an integrated approach is necessary to determine the best mix of environmental controls to minimize the adverse effects of pollution."

We suggest that this philosophy play an increasing role in the Agency's research planning and in the preparation of future Research Outlook documents.

The Research Outlook Review Subcommittee believes that special mechanisms will need to be devised to provide:

- Greater integration of short-term and long-term research. (Anticipatory research is not an end in itself.)
- More attention to intermedia and multimedia problems.
- More explicit ordering of research programs to deal with high priority items first and see them to some stage of completion.

The current Research Outlook presents three principal Agency priorities:

- "reduce public exposure to dangerous pollutants;

- protect sensitive ecological systems; and

- improve management of our environmental regulatory programs."

We believe the statement of these general goals is an excellent step. In fact we feel that these themes should be reflected throughout the research planning process as well as forming a common framework for the Research Outlook documents. Each section could list and discuss the planned research as it relates to these guiding priorities. We are not suggesting formal rigidity. Individual sections and their particular problems may change the priority order or emphasis. This is natural and probably desirable.

Research Outlook 1980 is a five-year plan, one in a series of such plans that is updated annually. Thus each document in the series overlaps four years with the documents that precede and follow it. One of the requirements in research management and resource allocation is a sense of continuity, since the present is built on the past and the future is shaped on present conceptions and structures. A greater sense of continuity would be helpful in Research Outlook reports. By this we mean the historical roots, successes, and failures that shape the current Outlook's research efforts and how the present problems are shaping the future. Explicit statements about what is newly included or emphasized, and why; and what has been eliminated or de-emphasized, and why, would strengthen the report.

Research Outlook 1980 explicitly identifies eleven research areas and allocates a chapter of the report to each. However, more attention should be given to the documentation of the research work to be done, the anticipated milestones that show accomplishments, and the amount of text allocated to each subject in proportion to the importance of each environmental research area to ORD and to the Agency. For example, we note that the toxic substances research area, which is described in the Introduction (page 2) as a program of much importance, is discussed with not much more depth than the noise research area. This latter program, not one of the topics presently addressed by its own Research Committee, seems to be given much more attention in the report than the allocation of ORD resources justify.

While it is important not to overlook or ignore research work that expends ORD resources, we believe that a comprehensive inclusion of the details of many research topics dilutes the attention of the readers, offers a false sense of priority, and detracts from the major topics. We recommend less attention to the comprehensive coverage of all the environmental research within ORD and recommend more attention to the setting of research priorities around major topics.

The Outlook in many chapters expresses an intention to execute very ambitious programs, such as large scale epidemiological studies, which we feel do not adequately reflect the resources that are available to complete these studies. The reader would be better served if long-term research "hopes and dreams" can be related to the resources which may be necessary to fulfill this work. Some promised programs are simply unrealizable with the resources available to the Agency.

It is worthwhile to address the problems that may arise when ORD is not able to meet some technical goals of the Agency. Some concepts such as "zero discharge of pollutants," which have meaning in the words of law, are not achievable in a strict thermodynamic sense. The Research Outlook can be a vehicle to provide a more careful measure of the Agency objectives that are and are not achievable by research. The report suggests that all technical objectives are reachable through support of the research program. This is, of course, a major overstatement and leads to disappointment, lack of credibility, and unfulfilled promises.

There is an implicit sense in the report that technologies are known, but developed to a very limited extent, for the control of specific chemical substances. This is work that will support the control of toxic substances at levels of detectability. We believe that this sense of the state of control technology is misleading and does not reflect the true situation. Control technology for particular chemical species at levels of detectability is at the very fringe of science. We are much further advanced in the ability to detect the presence of a chemical species than we are able to engineer systems to control waste streams at these same levels. This is a major problem and deserves more careful planning, evaluation, and research on whether or not the concept of control technology at level of detectability will ever be realizable. The goal of the law (and the Agency) is clear with regard to the control of the release of toxic materials, but the expectations to be realized from technical research should not be confused with societal goals. The scientific advances that permit detection of chemicals at lower and lower concentrations are not paralleled today with similar achievement in the state-of-the-art of control technology.

We understand that hard and fast divisions of budget, in any year, are not possible to predict with accuracy, and possibly the division of options into media makes it easier for Research Committees, in their present set-up, to operate. The approach, however, also leads to vagaries of description so that one cannot really decipher exactly what projected work will be. In view of the ambition of the Agency to achieve quality assurance, perhaps a beginning point should be in the use of language to describe needed projects (as well as the result of their research). Thus we can avoid having to deal with such non-quantitative terms as "diminished

effort"; "growth of effort"; "greatly extended"; "focus more on"; and "major growth area" -- all of which are presented to the reader without modifiers.

There is no explicit expression of what the priorities are in each mission. Thus, it is difficult to understand exactly what would be done in the cases of high, moderate, low, or no growth and to have an idea of what specific projects are to be enhanced or dropped. Yet, there is an allotted sum of money for each mission. Just what is the breakdown of allotment for each mission, and how does it correlate with each set of priorities? It would be much more logical to show more explicitly how each Research Committee treats the problem. Furthermore, although there were no Research Committees -- as yet -- for energy, anticipatory, and noise, a sum is allotted in each case. Just what did ORD have in mind with regard to specific priorities and their costs when these amounts were apportioned?

The Outlook could be more useful if it contained a more explicit identification of the resources (people, facilities, equipment, and dollars) available to carry out the proposed research. Such an identification of resources should consider those available within the Agency as well as those available in other government agencies, universities, and industry. Clearly, the research needs of the Agency have not and cannot be met totally within the Agency and, thus, the assistance of others is essential. Planning for use of the assistance should be explicit and not on an ad hoc, as the need arises, basis as has frequently occurred in the past.

The Agency proposes to develop short-term tests to predict the toxic effects of chemicals in humans and the ecosystem and models to predict the long-term fate and effects of a range of pollutants. Such tests and models often become entrenched before they have been validated. Historically, the Agency has tended to postpone the expensive and elegant work required for validation, and thus to have available at any given time a range of tests for which there is no scientific consensus on validity. Research Outlook 1980 appears to continue this trend, with validation scheduled for completion three to five years after development of tests and models. This is a planning and research mistake of major dimensions. Predictive tests and models should be validated concurrently -- or nearly so -- with development.

In the 1980 Outlook, as in 1979, introductory materials and program descriptions recognize ecological effects and even effects on ecosystems as substantial problems. Planned research, however, fails to reflect the importance of these problems. Research on ecosystems is apparently almost nonexistent in EPA. The Subcommittee believes future Outlooks should give more consideration to research directed at understanding ecosystem functioning and the degree to which such functioning is impaired by pollutants.

In summary, Research Outlook 1980 is substantially better than preceeding Outlooks. The Research Outlook Review Subcommittee is hopeful that the criticisms that we have made, singly and collectively, will lead to continued improvement in these reports.

Sincerely,

John L. Buckley
Chairman
Research Outlook Review
Subcommittee
Science Advisory Board

Attachments

TAB A

U. S. ENVIRONMENTAL PROTECTION AGENCY
SCIENCE ADVISORY BOARD

RESEARCH OUTLOOK REVIEW SUBCOMMITTEE

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Dean
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Columbia, South Carolina 29205

TAB B

Review of Research Options and Resources from the draft of Research Outlook for 1980

Research Options

General Remarks

As stated in the text of the research options, these are organized by media. More effective would be to organize them by specific problems or problem areas and how they impact on the media, intermedia, and people (health). In this manner, research committees can decide how to approach these same problems with the expertise already under their control.

It is understood, I believe, that hard and fast divisions of budget, in any year, are not possible to predict with accuaracy, and possibly the division of options into media makes it easier for research committees, in their present set-up, to operate. This approach, however, also leads to vagaries of description so that one cannot really decipher exactly what projected works will be. In view of the ambition of the Agency to achieve quality assurance, perhaps a beginning point should be in the use of language to describe needed projects (as well as the result of their researches). Thus we can avoid having to deal with such non-quantitative terms as: "diminished effort", "growth of effort", "-greatly extended-", "focus more on", and " major growth area " - all of which are presented to the reader without modifiers.

There is no explicit expression of what the priorities are in each mission. Thus it is difficult to understand exactly what would be done in the cases of high, moderate, low, or no growth and to have an idea of what specific projects are to be enhanced or dropped. Yet there is an allotted sum of money for each mission. Just what is the breakdown of allotment for each mission and how does it correlate with each set of priorities? It would be much more logical to show more explicitely how each research committee treats the problem. Furthermore, although there are no research committees - as yet - for energy, anticipatory, and noise, a sum is allotted in each case. Just what did ORD have in mind with regard to specific priorities and their costs when these amounts were apportioned.

Specific Items

Some explicit points stand out enough to warrant further remarks.

1. There is considerable doubt that "short term" tests can lead to reliable prediction of medical or ecological effects. Furthermore if"rough screenings" are to be used, there needs to be more detailed information as to their reliability - especially if they are what more intensive investigations are based upon.

2. There is practically no mention of the consideration of economics in areas where enforcement will be stressed. Since we are given no detailed information about these future enforcement areas, we cannot tell whether or not there is a diminished or

or advantageous return on their application - more candidly, are they worth it with regard to the general public and how much stress will there be on the private sector, and in what ways can each situation be alleviated or solved.

3. Health effects are mentioned frequently, but in no case do we learn what specific type of liaison there is between the research and health studies or whether the health authorities are working on short-term effects or long range research. Are health studies included in these budgets or do they have their own?

Resources

Along with this discussion of research options in which I have already noted that neither specific priorities nor budget allotments are given foe these areas within each mission, the same vagaries apply to resources. We have no idea how budgetary breakdown is placed within missions. This means that we have no idea how many persons are involved in any one project or whether the task is to be contracted externally. The status of equipment and facilities to carry out the task functions is also an unknown entity. In addition there is no projection of change in facilities and equipment although projections of large sums are readily forthcoming.

This lack of specificity in presentation of options and resources makes it very difficult to assay the worth of projected tasks. Any reviewer of the research outlook must be aware of this. Certainly brevity of text along with a rather "outlined" presentation with greater specificity would be most desirable.

Leonard J. Greenfield
Dec. 27, 1979

TAB C

INHALATION TOXICOLOGY RESEARCH INSTITUTE

LOVELACE BIOMEDICAL AND ENVIRONMENTAL RESEARCH INSTITUTE, INC.

P.O. Box 5890 Albuquerque, New Mexico 87115

December 26, 1979

Dr. John R. Buckley, Chairman
Research Outlook Review Subcommittee
EPA Science Advisory Board
Whitney Point, New York 13862

Dear Dr. Buckley:

I have carefully reviewed the October and December drafts of Research Outlook 1980 and Participated in the November 19th and December 18th, 1979 meeting of the Subcommittee. I offer the following comments on the Science Advisory Board participation in the Review of the report and on the report itself.

1. The approach used the past three years in which the SAB reviewed and commented on successive drafts and then attempted to critique the report is unsatisfactory on several counts.

   (a) Involvement of the SAB in reviewing and commenting on early drafts and then later in preparing a critique of the report for the Administrator puts the SAB in the role of critiquing what is in part its own efforts.

   (b) The nature of SAB involvement in changing a report on a research plan that should exist elsewhere puts the SAB in the position of making superficial adjustments that are primarily of a cosmetic nature, i.e. it is not clear that the changes suggested by the SAB really extend beyond the report into the heart of the plan itself.

   (c) The role of the SAB in the report preparation process can be, and indeed has been, misinterpreted as being a role of active participation in the planning process. It should be made clear to the Assistant Administrator for Research and Development, the Administrator and the Congress that the SAB role has been restricted to reviewing the report. The SAB has <u>not</u> been an active part of the research planning process. This may be the most appropriate role for the SAB. In any event, it should not be misrepresented.

2. The document reflects a general improvement in the research planning process within EPA. Indeed, in the first several 5-year plan documents, it was not clear from the documents that a planning process existed. Within the present document there is clear evidence of a planning process, a process that places major emphasis on promoting a linkage between research and development activities (Office of Research and Development) and users of research information (Program Offices).

3. The strong emphasis on use of problem area oriented research committees

in the research planning process raises concerns that the research program will be excessively compartmentalized by problem areas. Many of the research committees are oriented to a single media, i.e. air or water and thus, there is potential for losing sight of the multi-media nature of many, if not most, of the problems of pollutants impacting on ecosystems and ultimately man.

4. The almost exclusive use of research committees that are strongly problem oriented for planning the agencies research program results in a potential for the research program favoring effort on well-identified problems that can be tackled in the near term, i.e. short-term efforts yielding relatively predictable results. Conversely, inadequate attention may be given to the conduct of research that may not be as applicable to a given immediate problem or may require support over a longer period of time. Such long-term research has the potential for yielding results that may have greater impact than the short-term research, even if the results are not so predictable.

5. Many of the legislative mandates of the agency are very precise leading to specific identification of associated research needs. Most of the research outlined in this document is of this type. Such research must be performed, however, there should be more adequate recognition that some research needs extend beyond the explicit needs of the legislative mandates if the agency is to fulfill its broad charter. Two examples will illustrate the point. Under the Clean Air Act as amended, the agency is required to periodically review and revise ambient air quality standards. Much of air pollution research is directed toward developing information used in this review and revision process. What is missing from the research plan is a broader program directed at understanding how airborne pollutants are released, transformed, transported, ultimately inhaled and deposited in the human respiratory tract and produce respiratory disease. The second example relates to the agencies relative lack of involvement in the field of ecological research. The lack of attention given to this area is presumably related to the lack of need for ecological data to meet explicit legislative mandates. Despite the lack of explicit mandates, many individuals have the impression that the agency has a strong implied responsibility to support the conduct of a broad range of ecological studies. Such studies are needed to better understand how man and his environment inter-relate to detect changes in the environment as a result of man's activities and to predict potential adverse impacts.

6. The research document frequently and appropriately calls for the development and use of models for predicting the fate and effects of pollutants. These models are of several types. For example, there is extensive reference to the use of short-term test models for predicting long-term health effects such as cancer. Other models are proposed to predict the dispersal and fate of airborne pollutants. The usefulness of these models is directly related to the extent to

which the models are validated. With the research plan, inadequate attention is given to such validation leading, in some cases, to what appears to be overly optimistic statements as to the usefulness of the models.

7. The usefulness of the report could be enhanced if it contained a more explicit indentification of the resources (people, facilities, equipment and dollars) available to carry out the proposed research. Such an identification of resources should consider those available within the agency as well as those available in other government agencies, universities and industry. Clearly, the research needs of the agency have not and cannot be met totally within the agency and thus, the assistance of others is essential. Planning for use of the assistance should be explicit and not on an ad hoc, as the need arises, basis as has frequently occured in the past.

8. A statement of problem areas and objectives as contained within Research Outlook 1980 is obviously only part of a dynamic research process. To be effective the research plan must include an implementation strategy based on consideration of the objectives and the resources available to meet them. An appropriate implementation strategy defines how available resources will be deployed to achieve the stated objectives. For example, it would identify the areas in which the agency has adequate manpower (with the required level and type of expertise), facilities and equipment at its disposal either within or outside the agency and how they will be deployed. Equally important, the strategy will identify areas where adequate manpower, facilities and equipment are not available to meet the objectives and propose alternative solutions. By failing to lay out an implementation strategy, the agency leaves the impression that it can realize all the stated objectives if only enough funds are provided. In a number of areas this is not the case, i.e. funds are not the major constraint in meeting the objectives. For example, a doubling or tripling of the agencies budget in areas requiring expertise in epidemiology, camparative pathology or toxicology will not substantially increase the probability for success in these areas because the agency does not have a sufficient number of people well-trained in these disciplines.

9. Beyond statements of objectives and a strategy for realizing them there must also be a system for monitoring of research results to evaluate the effectiveness of the process used to plan and conduct the research. In short, a determination must be made of plan's value as an effective management tool in obtaining high quality responsive research results. If the appropriate results have not been obtained then consideration must be given to altering the planning and implementation process. This may include revision of objectives. In the past there has appeared to be an absence of this type of feed-back loop in the agencies research operations.

10. The section on anticipatory research does not provide an adequate description of this important area of endeavor. As presented, it leaves the impression that anticipatory research in something apart from the mainstream of the research program. In my view, I see anticipatory research as the leading edge of the agency's core research program.

If you have need for any further input from me, please do not hesitate to call me.

Sincerely,

Roger O. McClellan, D.V.M.
Director

ROM:lf
xc: Dr. J. F. Allen
SAB Research Outlook Review
Subcommittee

TAB D

December 18, 1979

TO: John L. Buckley, Chairman

FROM: Dr. F. C. McMichael

SUBJECT: Items 3 and 4: Research Outlook 1980 Subcommittee Review

Item 3

The Research outlook 1980 explicitly identifies eleven research areas and allocates a chapter of the report to each topic. However, more attention should be given to the documentation of the research work to be done, the anticipated milestones that show accomplishments, and the amount of text allocated to each subject in proportion to the importance of each environmental research area to ORD and to the Agency. For example, we note that the toxic substances research area, which is described in the Introduction (p.2) as a program of much importance is discussed with approximately the same amount of text as the noise research area. This latter program, which is not one of the topics presently addressed by its own ORD research committee, seems to be given much more attention in the report than the allocation of other ORD resources justify.

While it is important not to overlook or ignore research work that expends ORD resources, we believe that a comprehensive inclusion of the details of many research topics dilutes the attention of the readers and offers a false sense of priority away from the major topics. We recommend less attention to the comprehensive coverage of all the environmental research within ORD and recommend more attention to the setting of research priorities around major topics.

Item 4

The Research Outlook 1980 clearly describes the initiation of the research committee system which provides a working forum for the planning of a research program that is responsive to the needs of the program offices. We recognize the importance of the need for the ORD to provide support to the rest of Agency, however we feel that the report does not adequately explain the relationship between some research programs and the Agency objectives.

The report in many chapters expresses an intention to execute very ambitions programs, such as large scale epidemiological studies, which we feel do not adequately reflect the resources that are available to complete these studies. The reader would be better served if long-term research "hopes and dreams" can be related to the resources which may be necessary to fulfill this work. Some promised programs are simply unrealizable with the resources available to the Agency.

It is worth while to address the problems that may arise when ORD is not able to meet some technical goals of the Agency. Some concepts such as "zero discharge of pollutants" which have meaning in the words of law are not achievable in a strict thermodynamic sense. The Research Outlook can be a vehicle to provide a more careful measure of the Agency objectives that are and are not achieveable by research. We believe the report suggests that all technical objectives are reachable through support of the research program. This is, of course, a major overstatement and leads to disappointment, lack of credability, and many unfulfilled promises.

There is an implicit sense in the report that technologies are known, but developed to a very limited extent, for the control of specific chemical substances. This is work that will support the control of toxic substances at levels of detectability. We believe that this sense of the state of control technology is misleading and does not reflect the true situation. Control technology for particular chemical species at levels of detectability is at the very fringe of science. We are much farther advanced in the ability to detect the presence of a chemical species than we are able to engineer systems to control waste streams at these same levels. This is a major problem and deserves more careful planning, evaluation, and research on whether or not the concept of control technology at level of detectability will ever be realizable. The goal of the law (and the Agency) is clear with regard to the control of the release of toxic materials, but the expectations to be realized from technical research should not be confused with societal goals. The scientific advances that permit detection of chemicals at lower and lower concentrations are not paralleled today with similar achievement in the state-of-the-art of control technology.

TAB E

COLLEGE OF NATURAL RESOURCES
UMC 52
Utah State University
Logan, Utah 84322

Department Wildlife Science
752-4100 EXT. 7928

January 7, 1980

Dr. John Buckley, Chairman
Research Outlook Review Subcommittee
Science Advisory Board
Environmental Protection Agency
Washington, D. C . 20460

Dear Dr. Buckley:

I have reviewed the "Research Outlook, 1980" and submit the following comments in criticism of the report:

1. This "Outlook" is the best of the reports I have reviewed since their production was mandated. It is, in general, well organized, rational in its presentation, and reasonabally well written. It is an improvement over last year's.

2. When one makes an effort to relate the priorities as listed in the "Introduction" to the description of the tasks at the end of each of the chapters concerning "Toxic Substances", "Air", "Water Quality", "Pesticides", and "Energy" one gets the impression that human health (first order of priority) is over-emphasized while ecological systems (second order of priority) are hardly mentioned at all. It seems important to me that if ecosystems are to be emphasized as a second order priority, more space should be devoted to them.

3. I recognize the importance of establishing some expeditiously followed protocol for the screening of toxic substances. I also, however, see a problem emerging in subsequently establishing criteria for standards as a result of too much emphasis on the screening of toxic substances and not enough on the effects the substances will have on ecosystems or their components. I often wonder why a search has not been undertaken to establish, a) the most sensitive systems to chemical disturbances, b) the most sensitive organisms in North American ecosystems, and c) the most vital organisms of these systems. Such a search could afford EPA with a substantially simplified criterion establishment effort.

4. Though the remarks made in 3 above are made relative to the effort in toxic substances, the same remarks hold for "Air", "Water Quality", "Pesticides", and "Energy".

5. I am still very much concerned with what I believe to be the short-sighted ecological view expressed by most of the Agency's scientists and/or regulators. I agree that human health should be emphasized but not at the exclusion of ecological studies. This attitude is still very much an expression of a short term concern and ignores the ultimate long term human welfare effects. We do need information on the long term human welfare consequences of our control efforts and we are not getting it with our current human health philosophies.

Sincerely Yours,

John M. Neuhold
Professor

TAB F

DONALD H. PACK
CONSULTING METEOROLOGIST

1826 OPALOCKA DRIVE
McLEAN, VIRGINIA 22101
(703) 356-4233

November 1, 1979

Dr. John L. Buckley, Chairman
Research Outlook Subcommittee, SAB
P.O. Box 263
Whitney Point, New York 13862

Dear Dr. Buckley:

I have worked my way, twice, through the "1980 Research Outlook, First Draft".

The initial approach was quite conventional - note taking, identifying research problems not addressed, etd. This effort was quickly overtaken by the sheer mass of material. There are pages on pages of research project listings, milestones, etc. to the extent that an item by item critique does not seem feasible. Instead of such detail I would like to raise what I believe are larger issues.

1. The Outlook does not contain any synthesis or statement of over-all Agency priorities. Some individual sections (e.g. Pesticides) had a convincing internal logic but no where is there any comparison of the importance say, of noise vs toxic substances, or air pollution vs solid wastes. Within the categories individual substances are often listed without providing any statement of relative importance (e.g. Air Pollution - inhalable particulates vs oxidants).

2. Much of the research effort is mandated by legislation. Should these "no choice" efforts be identified separately from those EPA chooses, independantly, to pursue?

3. The multi-media issue is neither clearly stated nor is there much research described to evaluate the relative hazards of polluting the air vs the water vs the soil. To tak a potentially controversial example - What is the trade-off between air pollution reduction by stack gas cleaning vs increased solid waste/water pollution? How are the benefits/costs/research issues of the multi-media problems resolved by the present EPA Research Committee System?

4. Modelling is playing an increasingly central role in determining the the fate of contaminants and tracking them through the environment. What are the common factors between media? Should there be multi-media models? Does EPA have adequate computer facilities to operate these models? Can the computer facilities be made more accessible and efficient? The Research Outlook does not address this issue.

5. The section on Energy involves: Air pollution, Toxic substances, Water Quality, Industrial wastes, Solid and Hazardous wastes. This section epitomizes the need for quantifying trade-offs between media. If techniques (e.g. <u>very</u> tall stacks)could keep utility NO_x levels below concentrations inimical to human health would the acid precipitation effects be sufficiently severe to require NO_x removal? The social/economic penalty of either course of action requires study.

6. It seems to me that the concept of zero hazard to the total population is neither viable or relavant in an industrial society, This zero risk concept seems implicit in much of the Outlook especially in the Toxic substances area. Further it seems more defined by the lowest level of detectability, which will certainly change, than by quantified population risks. What level of insult or risk is socially and economically acceptable perhaps even unavoidable? If the population at risk is sufficiently small what R & D on direct protection for this segment should be done? For example I have a friend in Los Angeles who has an activated carbon filter on the air intake to his automobile's interior.

I do not quarrel with the methodology or the divisions established by ORD to produce the Research Outlook. The environment is a total system and can be sliced in an infinite variety of ways, none of which will be completely satisfactory.

I do believe however that the Outlook very much needs a synthesis section on goals and priorities that indicates:

Where are we going
What comes first
How we get there

Finally the work described accumulates to a staggering task. Despite the preceding comments the Research Outlook is a valiant attempt to move towards environmental improvement in an industrial society.

Sincerely

Donald H. Pack

DONALD H. PACK
CONSULTING METEOROLOGIST

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(703) 356-4233

December 17, 1979

Dr. John L. Buckley, Chairman
Research Outlook Subcommittee, SAB

Dear Dr. Buckley:

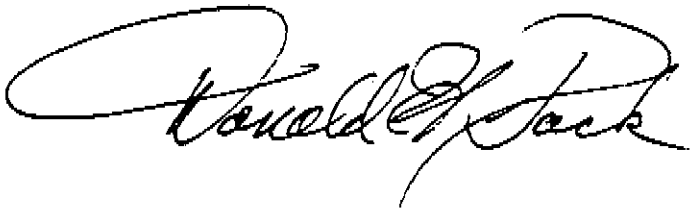
The revised draft of the 1980 Research Outlook received with Dr. Cage's memo of December 10, 1979 has been reviewed.

The present version is much more readable but is still not quite complete. I especially missed the Summary and any account of the activities of the crucial inter-governmental effort represented by the Interagency Task Force on Environmental Data and Monitoring.

My initial comments of November 1, 1979 stand. However I was pleased to see text revisions emphasizing the multi-media characteristics of environmental pollution. The "no free dumping ground" phrase (p.6 of the draft) indicates to me a perception of the problems that is beginning to parallel that towards the birth-to-grave evaluation required of the nuclear energy industry. I believe that such an attitude is all to the good.

It will be interesting to follow the evolution of these ideas through future Research Outlooks. Determination of multi-media trade-offs required to minimize socio-environmental problems (locally, regionally, and globally) is a most challenging and difficult problem.

Sincerely



TAB G

Dr. Winona Vernberg
1/4/80

In many respects the report tends to be unrealistic in terms of what EPA can accomplish, and there are many, many instances where the phrase "we will do . . ." is used seemingly without regard to reality. For example, costly and time consuming epidemiologic studies had been proposed to:

(1) Determine the possibility that drinking water contamination causes birth defects,

(2) To do a perspective study of cardio-vascular desase in a group of middle age men,

(3) To undertake epidemiological studies to establish if there is a relationship between sodium and 35 other inorganic contaminants that may occur in drinking H_2O,

(4) Epidemiological studies of people exposed of hazardous wastes and RF radiation,

(5) And to conduct an epidemiological study of people living in high density areas where air quality standards are sometimes exceeded. This is not to say that these proposed studies are not noteworthy, but implementation of all of them would require the major portion of the R&D budget.

Another illustration of unrealistic planning is the proposed research on the effects of noise. If even one of the proposed studies were designed and carried out as it should be it would take all the money allocated for noise research in EPA.

One of the major constraints placed upon an agency such as EPA is that research must be related to regulation. The trap that is easy to fall into, however, is that proposed research designs are too limited to enable the researcher to answer any more than the most narrow and specific set of questions. In turn this means that closely related questions that could have great bearing on a particular problem cannot be addressed. If the scientific community is to be able to address the multiple environmental concerns of our nation, then it is imperative that EPA recognize that research programs most go beyond a narrow or precise legal mandate.