ENGINEERING AND PUBLIC POLICY: REFLECTIONS BY THE 1980 (WISE) FACULTY-MEMBER-IN-RESIDENCE

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Summary

This paper reviews a most exciting summer (1980) lived by the author with 15 bright young junior level engineering students in a intense exploration of "engineering and public policy" in Washington, D.C. The paper briefly outlines the nature and characteristics of this program, the activities that occupied our summer, and concludes with some issues and ideas from the author's perspective.

The views expressed here are the author's. In no way should they be interpreted as the views of the EPEPP/WISE Program, ASEE, or Ohio University; or any of the other professional societies or institutions supporting this important effort.

Introduction

Because the summer of 1980 was such an exciting, meaningful and intense professional and personal experience – I feel more comfortable in expressing my perceptions of it and reflections on it in the first person.

"Educating" Prospective Engineers for Public Policy" (EPEPP) and "Washington Internships for Students of Engineering" (WISE) is a new thrust in engineering education that responds to the needs of these times, and promises to have substantive and positive impacts on the individual participants, the engineering academic community, the engineering profession, and on our society, which has often been characterized as a "technological society."

The dominant driving force in bringing to fruition this new engineering educational innovation has been Dr. Barry Hyman (University Washington – Seattle); assisted by an earlier ASME pilot experiment at involving undergraduate engineering students in the Washington, D.C. technology-policy arena.

It was my good fortune to have been chosen as the faculty member to organize and run the student internship portion of the program (WISE) in its first year of operation as "Faculty-Member-in-Residence." What follows is my attempt to compress in a few pages, ten weeks of exciting involvement in Washington the summer of 1980 plus a considerable preparation and follow up effort before and after.

A Brief Outline of EPEPP/WISE

In order to help you appreciate what follows let me first briefly outline the EPEPP/WISE program. A more detailed description can be found in reference (1).

My perception of the EPEPP/WISE program is that it is an innovation in engineering education that responds to important twin needs in our society – (a) the need for enhanced technical input into the making of public policy in engineering and technology areas, and (b) the need for a broadened awareness and understanding by engineers of the meaning of public policy in a democratic type of society.

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Thanks to Ferol for bearing with.

After several years of effort led by Hyman, this new program was launched in 1980 with major support by the National Science Foundation (NSF), several professional engineering societies and some private sector support by General Motors and the Sun Company. The following professional societies supported this program in its first year: the American Society of Mechanical Engineers (ASME), the American Society of Agricultural Engineers (ASAE), the National Society of Professional Engineers (NSPE), the Society of Automotive Engineers (SAE) and the Society of Manufacturing Engineers (SME). In the 1981 year an additional society, the American Nuclear Society (ANS) will also be supporting this effort. It is anticipated that professional society support for the program will grow to make in completely self-supporting by the end of three years. EPEPP is administered and coordinator by ASEE under the direction of Mr. Tim Bradley, Director, Projects and Federal Relations.

EPEPP/WISE contains three major integrated dimensions: (1) Washington Internships for Student of Engineering (WISE), (2) Case Studies on Engineering and Public Policy, (3) Faculty Workshops on Engineering and Public Policy. Each year of the program 15 bright junior level engineering students are competitively selected from colleges of Engineering across the USA. In 1980 these 15 came from Cal Tech on the West Coast to Catholic University in the East, and from Texas A & M to the University of Illinois, and from 10 other universities within these geographic limits. They had an overall grade point average of 3.8 out of 4.0 along with other indications of future leadership potential. They were selected from about 115 applicants. See Appendix I for a list of the 1980 students, their major fields of study, their university and the sponsoring professional society. Each student receives a stipend of $1,700 plus travel to D.C. for which he or she is expected to participate for 10 summer weeks. Each student receives 5 quarter credits in Engineering, 498A, "Engineering and Public Policy," from the University of Washington which she or he can apply for transfer to their home institution.

Under the direction of a "Faculty-Member-in-Residence" (also selected in a nationwide competition, a new one each year), these young engineers are exposed through seminars and discussion with policy makers and interest groups in Washington – to the milieu in which public policy interacts with engineering, science and technology. Each student is expected to identify a specific topic area of interest to him and the professional society that supports him or her (four of

the 1980 students were women). This topic is to have both a technical dimension and a public policy dimension. It is the student's responsibility to learn how to "poke the system" so as to acquire the necessary information so as to write a preliminary case study on "Engineering and Public Policy" by the end of the 10 weeks. See Appendix II for a list of student project titles for the 1980-year.

These student generated preliminary case studies are then reworked by Barry Hyman with help from his staff at the University of Washington and some of the EPEPP Board so that ultimately they will be suitable and acceptable for the ASEE Case Study Files. Incidentally, very few of the present ASEE Case Studies have a public policy dimension. The building of a professionally done collection of areas with both engineering and public policy facets is being done as a vehicle to extend the impact of the students' work to engineering faculty across the USA who might be willing to use one of them as part of a regular engineering course. For example, one of the 1980 students did a case study on "Regulation of Trihalomethanes in Drinking Water." Possibly an engineering faculty might like to use this case study as a small part of his or her course.

As a vehicle to acquaint engineering faculty with the case studies and assure an extension of this program, a series of workshops on using them are scheduled – the first one will occur at the 1981 ASEE Annual Conference in California. ASEE regional workshops are scheduled to further the impact. Finally, it is the intent of this program to promote parallel development and growth of engineering and public policy thrusts, modeled after EPEPP, at the state government level.

What We Did the Summer of 1980

Preparation

My personal philosophy, in contemplating arrangements for the summer was that the students should, early in the summer, be exposed to a wide variety of policy making institutions in government and to groups such as the private sector, environmentalists, consumerists, etc., who impact on policy makers. Not only should they be exposed to these groups but they should have their presence planted in the physical facilities of these groups and institutions as a vehicle to familiarize the students with the Washington scene. It was also very important to have the student develop a close harmonious working relationship with the professional engineering societies who were supporting them. One of the reasons for this was that we hoped that the professional societies could be helpful in directing the students toward projects that would have both an engineering and a public policy dimension – and that were of interest to the engineering society.

A second consideration in planning the summer was that of "who should do the initial orientations and lead the seminars?" Should I attempt as in a regular college classroom, to try and cover this vast territory – or should it be done by those who are doing the public policy and impacting it? It did not take long for me to opt for the latter option. Why should I try to lead several seminars when all the rich potential of the city lay there waiting to be tapped for the purpose of our summer?

Having decided to use the resources of Washington as our classroom for immersing the students in the technology – policy arena in preparation for them to tackle their individual case studies; I found it necessary to spend a considerable amount of time and effort in just getting to first two weeks firmed up prior to our first day on June 16, 1980. Those of you familiar with the Washington scene will know what I mean when I say it is not easy and sometimes not quite feasible to arrange a seminar with a Congressman, or with a particular division in EPA or DOE several months in advance – and be assured that the meeting will materialize. Furthermore it is impossible to foresee long in advance what some of the interesting Congressional Hearings and Executive Agency meetings will be. Therefore, there has to be a certain degree of "ad-hocness" in arranging things for the summer. I found that my prior experience in D.C. (1977-78 sabbatical leave year with the Congressional Office of Technology Assessment) was a very valuable asset in enabling me to arrange what I was able to prior to our descending on the city.

My objectives then were to intensely immerse the students in the early part of the summer in seminars with policy makers, impacters, and impacted – so as to launch them later in the summer on their own individual quests.

Administrative arrangements were made by ASEE to house the students in a George Washington University dormitory. Office and classroom space was also provided by G.W.

Readings and Project Suggestions to the Students Prior to Their Arriving in D.C.

As a vehicle to get the students started prior to arriving in D.C., about six weeks prior to June 16th, I sent them a short list of books and one periodical collection asking them to acquire and read them prior to arriving. The books were Redman, E., The Dance of Legislation, and (2) Lowrance, W., Of Acceptable Risk: Science and the Determination of Safety (3). The periodical collection was Public Administration Review, Volume 38, No. 2, March/April 1978 (a set of papers on the professions, including engineering, in government) (4).

The Redman book was chosen because of its excellent portrayal of the legislative process. The Lowrance book – because it is a kind of primer on risk/benefit issues that abound in technology policy conflict. After arriving, the students were literally buried in reports and papers collected at many of the seminar sites around the city. I provided them with other reading materials such as reference (5) and (6) which we briefly discussed.

About two weeks prior to our first day I again communicated with the students giving them a list of some 64 potential projects. This list was generated with the help of the EPEPP Board. It is interesting to note that many of the 1980 students came to Washington with rather formed ideas as to what project they wished to undertake, therefore our list of 64 was probably not all that useful.

Scheduled Activities

The program started with a bang at 9 am on Monday, June 16th with an all day welcoming and orientation session at ASEE headquarters. The supporting professional societies were invited to join in the welcome. Most of them had a representative there. Tim Bradley (ASEE and an

attorney) introduced us to the constitutional bases of public policy, and Martha Frangiakakis and Henry Ebert (ASME-Washington office) helped us to understand our way around Congress and through the Federal Regulatory process – using the Washington Monitor Reference Manuals as a guide (7) (8).

Following is an abbreviated listing of subsequent scheduled activities, meetings, and seminars. Group meetings and seminars were intensely scheduled early in the summer as a vehicle to get the students acquainted with persons and issues in a variety of institutions. The latter part of the summer, group meetings were curtailed as individual project work became the main focus. In addition to the scheduled meetings outlined here, the students were asked to develop and maintain cordial and cooperative relationships with the technical societies who were supporting them. Brief weekly reports were turned in by each student indicating individual contacts related to their projects. They were also asked to keep a personal diary of impressions and perceptions as the summer progressed. At several times during the summer individual one-on-one conference and group presentations by the students on their projects were held. The final two days of the program were devoted to presentations by each student of their project.

Our second day in Washington included a quick walking tour of the Capitol Hill area and a meeting with Congressman Don Ritter (R-PA) for his views as one of the few elected (technically trained) members of Congress – for discussion of his bill "Comparative Risks" (HR 4939). With him we had our picture taken on the steps of the Capitol.

In chronological order I list here the sequence of seminars and meetings scheduled during the remainder of the summer. The majority of these meetings were from one to two hours in duration. Several were evening sessions. [1] "Nuclear Power, Facts and Fiction" a congressional seminar program arranged by the American Nuclear Society; [2] a half day seminar and orientation by the U.S. Congress, Office of Technology Assessment; [3] two days at the AAAS Colloquium on R & D policy; [4] Library of Congress introduction to library facilities; [5] seminar with the Congressional Research Service, Science Policy Division; [6] a fund raising breakfast for Congressman Jack Brooks (D-Texas); [7] an ASME seminar on engineering and public policy at the state and local levels of government; [8] a seminar with the staff director and staff of the House Subcommittee on Energy Development and Applications on the role of Congressional staffs in policy making, [9] a meeting with the Congressional Budge Office on its role in S & T matters; [10] a seminar with the General Accounting Office; Congressional Hearing on National Materials Policy (HB 2743); [11] seminar with a Senate Committee staff person on the Congressional Hearing Process; [12] several meetings with EPA divisions (Deputy Administrator for Energy, Minerals, and Industry, Toxic Substances Division, Office of Solid Waste—Hazardous Waste, and Effluent Guidelines Division); [13] classroom focus on two laws, P.L. 94-163 and P.L 94-580; [14] Seminar on Building Energy Performance Standards; [15] boat cruise on the Potomac with the AAAS Congressional Fellows and a presentation on "Ecology and Water Resources of the Potomac"; [16] a seminar on moral and ethical issues in science and technology policy – University of Maryland Center for Philosophy and Public Policy; [17] luncheon with the Washington Technical Representatives; [18] a seminar on small R & D firms and federal funding; [19] meetings and seminars with several divisions of the U.S. Department of Energy (Assistant Secretary for Nuclear Energy, Office of Consumer Affairs, Office of Energy Research, Solar Energy Research Institute); [20] another session on BEPS; [21] a seminar with

the Federal Trade Commission on its role in Science & Technology (S & T) matters including voluntary technical standards systems; [22] entire day at the National Bureau of Standards (Office of Cooperative Technology U.S. DOC, NBS program planning, computer science, metallurgical division, mechanical engineering and process technology group, Office of Weights and Measures; Product Performance Engineering Division, and Nuclear Radiation Division); [23] a seminar with General Motors on a large corporations' lobbying activity in S & T areas; [24] a seminar on "appropriate technology" relative to S & T policy; [25] meeting DOE Assistant Secretary for Conservation and Solar Programs; [26] seminar on the consumer's perspective on S & T areas – Center for Auto Safety; [27] a seminar on international dimensions of S & T Policy – U.S. State Department; [28] resource recovery seminar – Institute for Local Self Reliance; [29] a visit and briefing at the U.S. Patent Office; [30] a seminar on engineering and public policy by a small S & T policy (Washington) think tank firm.

In addition to the above scheduled activities several spontaneous social gatherings were arranged by the students including a wine and cheese party for all the supporting technical societies. Also, for a two-day period the latter part of the summer we were visited by an outside educational evaluator to independently assess the strengths, weaknesses and general thrust of the program.

Follow-up Activity

Theoretically each student was to have a typed final version of his or her project done before leaving Washington. This was an optimistic hope that could not be realized because of the glut of typing service needs in the last couple of weeks of the program. Therefore I found myself receiving final drafts from several students, weeks after we had departed D.C. Reading reports, diaries, establishing grades, writing letters of reference and general communication with the EPEPP staff at the University of Washington and at ASEE in D.C. – occupied many hours well into Fall quarter of 1980-81.

Some Observations and Reflections From the Summer of 1980

The WISE/EPEPP program is a new innovation – a social invention. As such it should be viewed as a kind of a worthwhile experiment from which we learn, modify and adapt through our experience with it each year. It was especially exciting to have had the opportunity to have been the Faculty-Member-in-Residence in the first experimental run. This section of my paper contains some of my observations and reflections resulting from the summer of 80. I present them in no order of importance (simply as they come to mind) as a possible small feedback loop that might enable improved and new perturbations in coming years so that we grow in developing this social invention toward its potential. Furthermore the few observations that I make here by no means exhausts my store of them. There is simply not time or space in this short paper to do an adequate job of commentary on such a rich professional-personal experience.

The students were bright, self-motivated, and in general a friendly group of persons with whom it was a pleasure to work. They seemed to quickly establish good personal relationships with each other and to gain a sense of espirit de corps. We were outstandingly well received by those

in the city who dialogued with us about their particular roles and involvements in the technology – public policy arena. For example, at the Congressional Research Service, Science Policy Division seminar – the students were viewed as excellent candidates for future jobs with CRS. This experience occurred at many other times during our summer.

Relations with Technical Societies

Relations between the students and the technical societies supporting them were generally quite cordial. An outstanding example of an excellent relationship was that established by the staff in the ASME Washington office. There was a problem for those students whose support society did not have a Washington office – for example the two agricultural engineering students. I made several attempts, as did the students to locate ASAE professional in the D.C. area who could interact with them as a society professional. Problems like this will be reduced in subsequent interactions. ASAE/EPEPP Board members are arranging for specific ag-engineering people to serve as hosts for the 1981 group.

In one instance there were some rough spots; in this professional society- student relationships – stemming perhaps from different perceptions as to what this new WISE program was all about. In this case the supporting society interpreted the word "intern" in a more traditional sense to mean that they would have their students a fair portion of the time to perform whatever work they wished of them – including envelop stuffing if that needed doing. Operating on the philosophy outlined earlier, with an intense schedule of summer meetings all over the city (several arranged on a ad-hoc basis without long lead times) created some dissonance. Unfortunately two students got caught in the middle of these two different perceptions – mine and that of the professional society. Hopefully we learned from this experience, have patched fences and clarified perceptions so that there will not be a similar problem in 1981.

The issue raised by the case of different views of an "internship" is one that is rather fundamental. It needs to be dealt with as the WISE program evolves over the years. As a faculty member charged with the responsibility of handling the summer program in a way so that it will have academic respectability, I have my views, some of which were articulated earlier in this paper. On the other hand, I can understand the position of a supporting technical society who feels that since they are paying the "bucks" they should be able to "call the shots."

This potential conflict is also related to different views as to how best to give the students a meaningful learning experience in the D.C. area in 10 short weeks – and to meet the objective of the program to have each student produce a preliminary case study on engineering and public policy. It can be argued with some legitimacy that the best way to meet these twin objectives is to opt for the traditional view of an internship. Find a slot for the students -- perhaps in the technical society or better in some Congressional office or environmental or consumer group – and simply let the student work there at some "meaningful" job. One of the problems with this kind of arrangement lies in the adjective "meaningful" in terms of the objectives of the WISE/EPEPP program. With literally hundreds and perhaps thousands of "interns" working in the D.C. area each summer – I think it would be not so easy to find "meaningful" jobs that would maximize the students' understanding of the complexity that is technology and public policy in a democratic society.

In my view, if we truly wish to have the students grasp some of the truths and dilemma associated with the making of public policy in engineering science and technology areas in a society that still retains many individual freedoms for us as unique persons and institutions, then we would do disservice to our objectives and our students if we permitted them to become captured by any one limited and narrow view of the complex and fascinating process that we call democracy. While I can understand the desirable aspects of the traditional view of the role of an "intern" – I have fears that this route for the WISE program would tend to produce a much smaller sample of the richness, ambiguity, power, conflict and compromise that is the essence of this system of ours. This observation is related to another experience – the trade off between seminars and individual projects.

Seminar-Project Trade Off

WISE/EPEPP has several goals, two of which are (1) to provide the students with a sense of policy making in technology areas, and (2) to get an individual project from them which can become a case study. All this is to be done in 10 short weeks. What should the balance be? How should it be arranged over the 10 weeks?

Some of the students grew a bit upset with me, I am sure, for my poking them into areas with meetings and seminars that they said were not related to their projects. The project requirement, which I was not able to define too clearly for them (more about this later), built a fire under them. As responsible people they could see the weeks fly by, and they wished to immerse themselves in their task. The greater this narrower focus on projects -- the less the focus on breadth of understanding of the technology policy arena.

In one sense this trade off is really a false trade off that it was difficult to get some of the student to sense. There are many connections between the interests and involvements of various agencies, policy bodies, and interest groups in Washington. Unfortunately, walls of bureaucracy, which spawn limited perspectives in all of us as we toil in our own small cells, make it easier to ignore these connections and linkages. Let me illustrate with a couple of specific examples from our summer.

One student, whom I helped to focus on a project dealing with sewage sludge disposal – found that our seminar with the U.S. State Department on "International Technology Policy Issues," had something to offer him. Unfortunately it apparently did not sink in too well in that is was never reflected in his final report. I arranged for this student to interact with the District of Columbia Department of Environmental Services relative to their growing sludge disposal problem. The growth of sewage sludge is directly related to policy reflecting EPA water quality concerns. One of the options being contemplated by the District was to ship the sludge out of the country to the small Caribbean Island of Antigua. At the State Department we learned about international concerns with shipping our wastes to third world countries.

Another student whose project dealt with "Building Energy Performance Standards" serendipitously found in our visit and seminar with the Federal Trade Commission – a dimension he had never thought of or heard before, namely that in the conflict between promoters of BEPS

and those favoring ASHRAE 90-75 – there was a case brought by the gas industry to the FCT against ASHRAE – claiming that ASHRAD 90-75 biases the use of energy in new buildings toward electricity.

Ill Defined Student Project Focus

One of the frustrations experienced by both the students and me arose out of my inability to clearly articulate and give examples that would be helpful in assisting them to develop their individual case. Although I had not written cases for class use, I have used cases both as a student and in come classes of my own. Hence, recognizing my limitation in the writing of cases, as a port of the preparation for the summer, I contacted several experts in the writing of engineering cases – including John Alic, who is at the Office of Technology Assessment. As a group, during our visit with OTA, John shared some of his expertise with us, leaving us with the sense that in 10 weeks we should have 15 nearly ready case studies. I briefly explored the literature on case study writing, found several papers and with the help of Tim Jur, Henry O. Fuchs and the ASEE Cases Study File, acquired a few examples. Unfortunately almost none of the cases in the ASEE file have a public policy aspect. Papers on writing and using case studies were made available to the students to try and provide some guidance (9) (10). A few actual case studies were obtained from the ASEE Case Library and made available to students (13) (14) (15) (16).

In spite of these efforts a sense of frustration still prevailed in our struggle to write a preliminary case study with an engineering and a public policy dimension. Perhaps someone with more experience in case study writing could have handled this part of the program more effectively than I. However, the 1981 students and faculty member will have the benefit of our experience plus some of the reworked cases from the 1980 summer. This will help.

There were other interesting facets associated with getting the students started on their cases. In the second week I asked them to give me a first report on the case they hoped to develop. One student wanted to do an engineering and public policy case on "Scientific Creationism." Another thought that the Alaska Lands problem would make a good study.

In general, it was difficult to get them to identify a limited technical segment and tie it to a specific piece of legislation or a regulation arising out of the legislative action. The one project that comes most clearly to mind where this marriage was made quite effectively, was Tugendhat's exploration of Corporate Average Fuel Economy (CAFE) as related to test protocols and aerodynamic styling. Tugendhat's project dealt with a relative old piece of legislation PL 94-163 (1975). It was easier to get specific engineering details in this case because the implementation process had had time to get set in place. On the other hand this older topic is not one of the "hot" issues in the Congress and thus perhaps not as exciting from the student's perspective. We might generalize to say that the older the legislation the easier it might be to find a sharply defined engineering dimension in it – but the less sexy it is to the students doing it. Let me shift now to a quite different topic.

Policy-Engineering and the Courts

Early in this paper I outline our exploration with the Legislative and Executive branches of government. There is a third branch, the Judiciary, that increasingly finds itself involved with scientific engineering and technical issues (17). I made and intense effort to arrange a seminar with a Justice in either the D.C. Circuit Court of Appeals or the U.S. Supreme Court to explore with the students some aspects of the court's involvement in engineering issues. I was unable to get anyone in the Judicial Systems to meet with us – even one of the Justices' law clerks. Apparently since the recent appearance of the book The Brethren the court and all it people are "gun shy" about talking with outsiders. The one Justice with who such a seminar could have been held was Judge Harold Leventhal (D.C. Circuit Court of Appeals). Sadly he died in the Fall of 1979. Judge Leventhal was quite interested in the phenomenon of increasing science and technology issues in court cases.

To illustrate, the Supreme Court issued its decision in the "Benzene" case in July 1980. This case is loaded with risk/benefit, cost/benefit issues associated with a regulatory body, the Occupational Safety and Health Administration (OSHA) and with scientific and technical matters dealing with protecting workers from future leukemia cancers. There are many other such cases in the courts. A seminar with a Justice, on the "Benzene" case, would have been most illuminating in terms of our understanding of risk/benefit and cost/benefit issues relating to policy and technology.

WISE/EPEPP Supplements the Humanities and Social Science Component in Engineering

As one final reflection before ending this paper, let me note an important aspect of the WISE/EPEPP program – namely the potential it has to effectively supplement and perhaps strengthen the Humanities and Social Science (HSS) component of engineering education.

One does not have to look far or wide to detect discontinuity in the integration of humanities and social science courses and engineering courses. They do their thing with our students and we do our thing with them, and never the twain shall meet. An important element of the WISE/EPEPP program for bridging some of this chasm lies in its attempt to have the case studies on engineering and public policy used as small parts of regular engineering courses taught by engineering faculty.

Public policy in a democracy implies values, ethical, psychological, economic, historical, and political and many other ideas that are part of the humanities and social sciences. If we can have engineering faculty bringing even a small peek at policy issues into some of their classes we should be able to whet the appetites of our students to see more of the relevance in the HSS component of their education. We as faculty might even grow a bit in the breadth of our perceptions as we practice our engineering with excellence – if case studies in engineering and public policy catch on and grow.

From the perspective of humanities and social science faculty and students, perhaps we need think of a new social invention for them to enable them to more effectively appreciated the

engineering component in the policy issues that face us in a future world of resource scarcity and environmental degradation. Perhaps we might call this new invention WISHSS/EPHSSPP.

Let me conclude with a piece of poetry which I felt moved to write and give to the 15 young women and men who thrived with me in the summer of 80 in D.C.

Heads, Hands, and Hearts

WISE women and men
If the creations from your heads
Fashioned with you hands
Come from hearts
Tuned to love –
And the paradox of being human,
You are a part of our fulfillment –
For a generation.

Chuck Overby

Overby grew up in Montana. He receive a B.S. degree in Mechanical Engineering (with high distinction) from the University of Minnesota; M.S. in Mechanical Engineering (I.E. option), and Ph.D. (Interdisciplinary) from the University of Wisconsin – Madison. He has served on the teaching faculty at Wisconsin and Ohio State, and is presently a professor in the Department of Industrial and Systems Engineering at Ohio University in Athens. He has had several years of industrial experience, was a G.I. in WW-II, and a combat pilot and aircraft maintenance officer during the Korean War. In addition to teaching industrial engineering courses, he has developed a strong interest in "technology – society – public policy" issues, and has several papers and publications in this area. In 1977-78 he spent a sabbatical leave year with the Congressional Office of Technology Assessment. The Summer of 1980 he was the Faculty-In-Residence for the WISE program reported in this paper. His hobby, as long as the fuel holds out, is piloting light aircraft for psychological refreshment.

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Appendix I

WASHINGTON INTERNSHIPS FOR STUDENTS OF ENGINEERING (WISE)

List of 1980 Interns by Name, Major Field, University, and Sponsoring Society

Scott Buehrer, M.E., Virginia Tech., ASME
Peter Bulgarelli, C.E., Univ. of Ill., ASEE
Kristie Dalebout, M.E., Univ. of Utah, SME
Jeffrey Derby, Ch.E., Cal. Tech., SAE
Mark Evans, Agric. E., Ohio State, ASAE
Scott Ewing, M.E., S.M.U., ASME
Paul Faeth, Agric. E., Univ. of Florida, ASEC
Harold Giroir, Nuclear E., Texas A & M, ASEE
Cynthia Karbowski, M.E., Bucknell, ASEE
Steven Payne, Engr. & Public Policy, Washington Univ., ASEE
James Pye, C.E., Univ. of Illinois, ASEE
Dale Randels, C.E., Univ. of Arkansas, NSPE
Mary Shelman, Ch.E., Univ. of Kentucky, NSPE
Andres Tugendhat, E.E., U.C. Santa Barbara, SAE
Ruth Wang, M.E., Catholic University. ASME

Appendix II

WISE INTERN INDIVIDUAL PROJECT TITLES

Scott Buehrer – (Mechanical Engineering – VPI) "Public Policy Aspects of American Small Business Technological Innovation."
Peter Bulgarelli – (Civil Engineering – Univ. of Illinois) "The Issue of Subsurface Disposal of Hazardous Waste and the Protection of Ground Water
Kristie Dalebout – (Mechanical Engineering – Univ. of Utah) "Medical Device Regulation: Two Case Studies on Respiratory Ventilators."
Jeffrey Derby – (Chemical Engineering – California Institute of Tech.) "The Diesel Engine as an Alternative to the Gasoline Engine in the Automobile Fleet of the Near Future."
Mark Evans – (Agricultural Engineering – Ohio State) "Alcohol Fuels."
Scott Ewing – (Mechanical Engineering – SMU) "Innovation and Productivity: A Legislative Approach Through the National Technology Foundation – HR 6910."
Paul Faeth – (Agricultural Engineering – Univ. of Florida) "Agricultural Mechanization in Perspective."
Harold Giroir – (Nuclear Engineering – Texas A & M) "Nuclear Waste Disposal: A Look at Past Policy Effects."
Cynthia Karbowski – (Mechanical Engineering – Bucknell) "Ocean Thermal Energy Conversion: Theory and Legislation for the Application of a Century Old Technology."
Steven Payne – (Engineering & Public Policy – Washington Univ.) "Regulation of Trihalomethenes in Drinking Water: Engineering and Public Policy Issues."
James Pye – (Civil Engineering – Univ. of Illinois) "Sludge Disposal: Where and How."
Dale Randels – (Civil Engineering – Univ. of Arkansas) "Building Energy Performance Standards: Technology and Public Policy Intertwined."
Mary Shelman – (Chemical Engineering – Univ. of Kentucky) "Alcohol Fuels: An Introduction to Engineering and Public Policy."
Andres Tugendhat – (Electrical Engineering – U.C. Santa Barbara) "Problems with Implementing an Effective Automotive Fuel Economy Program"
Ruth Whang – (Mechanical Engineering – Catholic Univ.) "Commercial Radioactive Waste Management Policy."