Don't

JUST SIT THERE...

SOMEBODY ELSE IS DOING YOUR JOB!

Environmental Health Curricula
VS.
Job Requirements

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Environmental Health Education and Agency Jobs

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PROJECT STAFF

The University of Washington was awarded a HRSA Special Projects grant to develop and test a methodology for evaluating the degree to which environmental health curricula in Schools of Public Health meet the practice requirements of the various states, federal and local public agencies that employ their graduates.

The study involved examining the printed job descriptions for positions related to environmental health with state agencies in five states with schools of public health: Florida, Hawaii, New York, Oklahoma and Washington. Alaska was later added to the study through the effort of the project staff at the University of Hawaii at Manoa. The project staff at the five schools of public health which participated in the study are as follows.

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Abstract

The University of Washington was awarded a HRSA Special Projects grant to develop and test a methodology for evaluating the degree to which environmental health curricula in Schools of Public Health meet the practice requirements of the various states, federal and local public agencies that employ their graduates.

The ultimate goal of the project was two fold: (1) to provide Schools of Public Health with information so that they can evaluate the extent to which their environmental health curricula meets the needs of die agencies and organizations employing their graduates; and (2) establish new linkages between Schools of Public Health and public environmental health science and protection agencies which will —

- Open up additional internship and field practicum opportunities for students in Schools of Public Health;
- Expand employment opportunities available to graduates of environmental health programs in Schools of Public Health; and,
- Foster the recognition that a public health orientation and focus are necessary and appropriate to their agency.

The study involved examining the printed job descriptions for positions related to environmental health within state agencies in five states with schools of public health: Florida, Hawaii, New York, Oklahoma and Washington. (Alaska was later added to the study through the efforts of the project staff at the University of Hawaii at Manoa). The project staff identified each state agency in the six states, that employs people engaged in environmental health activities (broadly construed) including both traditional agencies like departments of health and non-traditional agencies, like departments of transportation. Data w as gathered on the stated educational requirements and specified skills desired by each agency. Data was also collected, as time permitted, on selected federal and local government employers of environmental health practitioners.

This report presents the findings of the study and some recommendations for future activities to help bridge the gap between agency needs and the environmental health curricula provided in the nations' school of public health.

I. PURPOSE

This special projects grant developed and tested a methodology for evaluating the degree to which environmental health curricula in Schools of Public Health meet the practice requirements of the various states, **federal and local public agencies that employ their graduates. We identified the stated educational requirements and specified skills desired by state, federal and local government employers of environmental health practitioners in both traditional and non-traditional public environmental health agencies within a representative set of states.**

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II. BACKGROUND & RATIONALE

Traditionally Schools of Public Health have prepared graduate students for employment with local, state and federal health agencies. However, there have developed serious gaps between what many faculties in Schools of Public Health feel their students need to know and what the potential employers of these students expect them to know.
(Public Health Faculty/Agency Forum/1991)

The gaps, identified in the HRSA sponsored Public Health Faculty/Agency Forum in 1991, are especially wide in the field of Environmental Health. Within the past four decades the field of environmental health has become increasingly complicated and fragmented. Today there are numerous government and private organizations that are conducting environmental health activities. Departments of labor, environmental protection, natural resources/ energy, and transportation are only some of the government agencies which employ environmental health professionals. They hire these individuals to conduct activities which involve the recognition, characterization and control of environmental factors which cause or contribute to the cause of death, disease/ injury or loss of property which fall within the traditional ambit of environmental health. Indeed the fragmentation of environmental health program activities has become so acute, that HRSA funded a project through the Johns Hopkins School of Public Health to identify environmental health related agencies and programs in each state. (Burke 1995) Academic programs in Schools of Public Health, for the most part, have continued to provide education in traditional environmental health. The 1989 report on the HRSA sponsored Environmental Health Faculty/Employer Forum concluded that

> "environmental health educational programs have become diffuse, with neither a general nor a specific focus. This has resulted in a decrease in the number of, as well as the skills of, true environmental health professionals. These are needed to integrate the many scientific, social, administrative, and political disciplines necessary for effective environmental protection programs. Both educational institutions and employers face a crisis in terms of what training to provide these professionals to develop appropriate skills." (Environmental Health Faculty/Employer Forum/1989)

Schools of Public Health are caught between the conflicting demands of conducting increasingly sophisticated research on the environmental causes and mechanisms of disease, and providing a broad-based, comprehensive understanding of environmental health. Most faculty in Schools of Public Health tend to be specialists (chemists, toxicologists, engineers, etc.).

> "Little research or instruction is carried out by persons with comprehensive environmental health backgrounds . . . and graduates tend to be technical specialists rather than environmental health professionals as they were in the past. Obviously, strong technical competency within a context of comprehensive competence is needed to resolve the dimensions of environmental health problems. The challenge is to strike the proper balance between the two." (Environmental Health Faculty/Employer Forum, 1989)

Knowing what the knowledge, skills and professional attributes which employers are seeking is a necessary component of the needed balance. **While the faculty in Schools of Public Health are well acquainted with the knowledge, skills and attributes which a student needs in order to be a successful scholar (i.e., academic researcher), they are arguably less well informed with the demands of the practitioners world.** This is especially true of many environmental health programs in agencies that have historically have had little contact with public health faculty. Nor are data readily available that can be used by Schools of Public Health as a "reality check" of their environmental health curricula. The closest approximation is the 1980 publication by the National Environmental Health Association delineating the roles and responsibilities of entry level and advanced sanitarians. (NEHA, 1980) Neither that study, nor any other researched study, made a concerted effort to include environmental health professionals employed in non-traditional public agencies or private organizations as part of its study population.

HRSA has made numerous attempts in recent years to bridge the gap between academic coursework and the needs and requirements of environmental health practice in the United States. A series of conferences and workshops, held in the 1980s, were designed to bring environmental health faculty, public and private employers of environmental health graduates together to discuss educational requirements. Another HRSA project, which included several of the investigators on this grant, developed environmental health education and training linkages among government agencies, academic institutions, private sector employers and environmental health professional associations.

However, despite these efforts, there are still significant gaps. **This project suggests that a major reason for this is a lack of understanding between the academic community and many potential employers about the knowledge and skills which graduates of environmental health programs possess and the needs of the employing agencies.** This situation is a result of two trends. Increasingly large proportions of environmental health faculty in Schools of Public Health are the product of discipline-specific education programs such as microbiology, chemistry/ toxicology/ engineering, and medicine, rather than of a broad-based environmental health curricula. Most of these individuals do not have significant practica experience with a local, state or federal public environmental health agency. The second trend, is the well-documented fragmentation that has occurred over the last thirty years in the field of environmental health and protection. Forty years ago there was essentially one environmental health agency at each level of government, now many exist. As these agencies expanded their programs, they employed hundreds/ and in some cases thousands, of new employees, few of who have had any formal preparation in public health. Even worse, as these agencies have grown, they have developed hiring practices that are either discipline specific (i.e., chemist, toxicologist, geo-hydrologist, microbiologist, etc.) or so general that any one with any baccalaureate or advanced degree is acceptable.

It was evident from the job announcements of several state environmental protection agencies that most of these agencies do not know, or understand the capabilities, of the broadly educated environmental health practitioner. The situation can only be worse in agencies with even fewer contacts

with the public health. community. Goldstein notes that

> "while there are many good reasons to keep EPA a separate entity from the Department of Health and Human Services, it is imperative there be close cooperation between EPA and the appropriate units of the U.S. Public Health Service. Most importantly, the number of people within EPA who are trained in public health disciplines must be increased. As a corollary there must be a concerted effort to educate students in a manner responsive to the need for public health manpower at EPA and at state and local agencies active directly or indirectly in environmental health issues." (Goldstein, 1988)

The Public Health Faculty/Agency Forum (1991) suggested that the gaps between the different cultures of academic public health and public health practice might be narrowed through practicum experiences; collaboration and communication; and education. This project attempts to provide a mechanism for bridging the gap by studying the published job requirements of the public agencies which conduct environmental programs related to public health in the six states. A review of the position descriptions and/or job announcements provided information which was previously not available about the number and types of job openings potentially available to students graduating from environmental health programs; the amount of experience required for each employment level; and the specific knowledge and skills which each agency deems necessary for each employment position. This information can be used by the faculty in the Schools of Public Health as a comparison standard for evaluating the content of their environmental health curricula. It can also be used to initiate a dialogue with the specific programs and agencies that will hopefully-result in:

(1) the establishment of new internship and field practice sites;

(2) an increased understanding by public sector employers that certain knowledge and skills are provided by academic programs and others which are necessarily or more appropriately learned on the job; and,

(3) revised position announcements showing a greater preference for graduates of accredited environmental health programs.

III. OBJECTIVES

The specific objectives of this project were:

1. To identify all public agencies, within a representative set of six states, which employ environmental health practitioners, or personnel in positions which require the knowledge, skills and attributes necessary to identify, characterize and control environmental health hazards;

2. To increase the number of potential sites for environmental health students in Schools of Public Health to participate in internship and practica experiences;

3. To increase awareness of the potential advantages of hiring environmental health practitioners by public sector employers, who conduct environmental health programs or programs directly related to environmental health;

4 To increase the communications and linkages between environmental health faculty in Schools of Public Health and the public sector employers of environmental health graduates; and,

5. To develop a process whereby Schools of Public Health can validate their environmental health curricula in terms of its applicability and attractiveness to the numerous public sector agencies that hire or ought to be hiring the graduates of these programs.

IV. PROJECT METHODS

The project staff performed a relatively simple and straight-forward review and analysis of agency position descriptions and job announcements, around which academic institutions and public sector agencies can begin to build a long term dialogue.

The proposed activities to support of the stated objectives include the following:

Objective 1. **Identification of Environmental Health Jobs:**

a. Project staff reviewed the job skills analysis literature and developed a methodology for extracting and analyzing pertinent information. This included:

1) A coordinated, joint literature review utilizing the resources of each of the project sites; and,

2) A meeting/conference of the Project Director and each of the State Coordinators to develop a draft methodology which was used in the extraction and analysis of data.

b. Project staff obtained existing information on the environmental health agencies and programs in each of the project states. This information was assembled, by Dr. Thomas Burke, of the Johns Hopkins School of Public Health and was made available to this project.

c. Project staff established contact with each environmental health agency or program in each of the six project states, and requested copies of all relevant position descriptions and job announcements.

d. Project staff extracted and analyzed information according to the methodology previously developed.

Objective 2. **Field Practica Sites:**

Project staff have shared the preliminary findings of the project with managers of environmental health programs in each of the target states. The intent was to use the data identify incongruencies between the knowledge and skills transmitted through specific academic courses and those sought by the specific programs. Program managers were encouraged to consider using graduate students to conduct specific projects for the agency. Ideally some projects will be identified of sufficient scope and scholarly interest to constitute an acceptable thesis project.

Objective 3. **Employment Opportunities:**

Project staff shared the preliminary findings of the project with the personnel managers of environmental health agencies surveyed. The intent was to use the data to identify incongruencies between the knowledge and skills transmitted through specific academic programs and those sought by the agency for specific job classifications. Personnel managers were encouraged to consider modifying their job announcements to clarify that graduates of formal academic programs in environmental health sciences are desirable and in some cases preferred candidates for agency positions.

Objective 4. **Academic/Practice Linkages:**

Project staff drafted a preliminary report and shared it with the faculty in each of the five Schools of Public Health and with each of the agencies from which information was obtained/ inviting their comments and criticisms. This draft report formed the basis for high-level discussion between faculty in the Schools of Public Health and the public agencies. Additional linkages will almost surely evolve as a consequence of the continuing discussions between faculty and agency personnel fostered through the two above activities.

Objective 5. **Environmental Health Curricula:**

The project staff surveyed agency administrators to validate the findings of the study and to solicit recommendations for changes in the environmental health curricula. The Project Director held a second meeting of the State Coordinators to: review the findings from each of the 5 states; discuss the implications and ramifications of the findings; develop specific recommendations for the use of the information derived; and, outline the draft of the preliminary report for the project.

The final results of the study will be shared with appropriate faculty within each of the schools.

Other Tasks and Activities:

Project staff drafted a preliminary and final report for review by selected administrators and faculty.

Data Collection Methods

John Hopkins University, School of Hygiene and Public Health sent a listing of the state environmental health and protection agencies to each of the project sites. This information was then utilized to determine which agencies should be contacted for possible inclusion in the project. Once identified, each of the relevant departments received a letter introducing the project and requesting their participation. The letter described the type of positions to be included in the study. Project staff contacted each state agency to assess which possessed jobs which utilized tie breadth of KSAs (knowledge/skills and abilities) typical of environmental health practitioners. Personnel administrators or agency directors were contacted to facilitate access to this information. The original request, which was in letter form, as followed up by periodic telephone calls from project staff, requesting the information and also answering any questions agency contacts might have had regarding the research project.

To reduce the possibility that a job position would be overlooked by either the human resource department or by an environmental department/ input was sought from both. Job-class specifications were sent by mail to the project. In some instances, repeated requests were made for the same positions due to the lack of response. Receiving the position descriptions in a timely fashion was problematic. deductions in staffing of these agencies made it difficult for them to respond quickly o the project's requests.

The review of available source documents resulted in the elimination of some ides from study consideration for a variety of reasons: the source information was lot sufficient for inclusion, titles did not sufficiently meet study definition, etc.

A three page questionnaire was designed by project staff using EpiInfo (a computer software program developed by staff at the Centers for Disease Control and Prevention (CDC) and widely used by health agencies for public health data collection and analysis) and used is the framework for extracting data from the written agency job descriptions, to ensure that the data collected would be comparable across job descriptions and across project sites (states). Data extracted from the questionnaire was then entered into an EpiInfo database providing a simple method for tabulating frequencies. The questionnaire was designed to gather specific information for each job classification. The types of information gathered included the title, agency, salary levels, general job category, degree requirements and permitted substitutions, academic major, required course work, required licensing or certification, general work experience, specialized training requirements, job content (which focused on specific technical areas of expertise like air quality or housing), job process skills (like training abilities or sample collection), job tools (which require a certain skill like problem solving or organizational skills), leadership, and interpersonal and communication skills. The data were sorted by job title to preclude duplication of positions, and tabulated to determine the percentage of environmental health KSAs.

A meeting of the staff from each of the participating states, except Florida, met in Chicago in conjunction with the NEHA Annual Meeting. At me meeting, the project staff from Washington demonstrated the basic functions of EpiInfo and presented their preliminary findings. They illustrated how the EpiInfo database was translated into a Microsoft Excel spreadsheet for simple tabulations, and then demonstrated how they generated their preliminary findings graphs. In addition, the combined project staff clarified issues relating to the differences in the data collected in the various states and worked on developing a uniform approach to the synthesis of the data — given the large differences found among the state personnel systems. Communication on this and other issues was maintained through follow-up conference calls and quarterly progress reports.

Data Management

Survey data from individual states were recorded and analyzed separately in each state taking into account state and regional variations and needs. Each state produced a draft and final report in which they presented their findings. In addition, the raw data from each state was submitted to the Washington State project staff where it underwent further refinement and analysis.

Data were received in a variety of formats (e.g. Microsoft Excel™ and EpiInfo on floppy disks. The data were translated, if necessary, into Microsoft Excel™ 5.0 format combined into a single comprehensive database. Because, five states were involved in the study, data formats were not always the same. For example, some Oklahoma jobs required an asbestos license that was not required by other states. Therefore, in order to bring all the states' data together under one master heading, a fading for asbestos was created within the licensing section of the database to accommodate me Oklahoma category. The other states had no data under this heading but it was necessary to create the heading to accurately record all the data. Other such headings were created when necessary to create a single format for the data from all participating states.

The data were then tabulated to determine the frequency for which a particular ill or knowledge was required. Some states (New York and Florida) designated KSAs as required or desired based on their state's job descriptions. These distinctions ere dealt with as described below.

Data Analysis

Both EpiInfo and Excel™ were used for data analysis. The data extracted from the individual job descriptions were recorded in EpiInfo using the survey instrument described above. For each job description, information was recorded regarding the agency or agencies employing personnel in the job category, educational and other entry qualifications and requirements, specific technical knowledge and skills required or desired, and general (personal relations, communications, etc. skills) required or desired. The individual state and combined data sets were then reviewed to eliminate duplicate job descriptions reported by more than one agency. (For example, a state department of personnel and the state health department might have provided job descriptions for the same position.) The data sets were also reviewed to ensure completeness and accuracy.

The data were then exported into an Excel™ spreadsheet for tabulation and further analysis. Raw totals were converted to percentages for comparative purposes. Data were segregated into the four broad, but logical, categories of job content, knowledge areas, skill areas, and communication skills, and cross-tabulated by agency and job type.

Tabulations and percentages were calculated for each job position to determine the total number of, and the relative frequency for, each position that required a specific requirement or KSA. Both vertical bar graphs and radar graphs*were constructed in Excel™ 5.0 for each KSA category (e.g., job content, job process, communication skills). Individual graphs of total numbers and percentages in each of the relevant categories were constructed for each state and for the entire database.

Overlap

Overlap of individual KSAs within KSA categories (e.g. leadership skills, job process) was determined by summing the number of KSAs required for each individual job. For example, in the leadership skills category, if a job required the ability to work independently and also be a team leader, that job was assigned a value of two. Values were assigned to each job within the database and the average of these values divided by the number of KSAs in the category was considered the overall overlap for that KSA category. This procedure was used for all KSA categories.

Combinations

The most common combinations of KSAs within each KSA category were determined by assigning individual designators to each KSA, and then summing and sorting these numbers. These data were assigned a numeric place designation so that the combinations of knowledge skills or abilities are easily recognizable. This system also facilitated calculating the frequencies of KSA combinations. Using the general job category, as an example, "technical" was assigned a value of 10,000, "policy" was assigned a value of 2,000, "regulatory" was assigned a value of 300, "public relations" was

*Radar graphs show the distribution of the relative frequencies (in percent responding of affirmative) among the total number of categories in the analysis. We found this method of viewing the data useful in obtaining a quick overview of the relative similarities and differences represented by various agencies, job classifications and skills levels.

assigned a value of 40, and "administration" was assigned a value of 5. A value of 40 does not indicate that public relations is eight times more important than administration; it merely holds the four

in the tens place when these numbers are summed. So, a job that represented all five job categories was assigned a value of 12,345. After determining values for each job, these values were sorted and counted to determine the number of jobs requiring those combinations of skills.

Curricula Review

The process, through which the curricula at the various Schools of Public Health are evaluated for possible changes, varies from school to school and from department to department within schools. In most cases change occurs in an incremental fashion with a particular faculty proposing to add, drop or modify a course to their program, department or school curricula committee. The curricula committees then review the guest for academic merit and to avoid duplication or overlap with existing courses. Little attempt appears to be made to evaluate, at the school level, how a particular course fits with the overall mission and goals of the program.

This project attempted to encourage the environmental health faculty at the various schools to take a more structured and considered approach to their curricula review. The presentation of the preliminary findings to faculty of which KSAs were most highly sought was uncomfortable for some of the faculty, especially faculty in major research oriented institutions. These faculty were brought face to face with the reality that technical knowledge and skills, while important, were not all that employers were looking for in graduates of environmental health programs. The curricula review survey also helped faculty identify the content areas they most focused their lectures, readings, and assignments — in terms of the amount of time spent on each KSA. Faculty/Agency linkages fostered by me project, like the “EH Career Day” held at the University of Washington, also gave faculty an opportunity to discuss KSA needs with potential employers of their students. All these activities helped faculty and agency administrators evaluate and discuss curricula and KSAs, leading to a greater understanding of the interplay between the two.

V. RESULTS

Job Descriptions

Hard copies of all job descriptions were collected by the project staff in each state throughout the first two years of the project. Almost all agencies responded with some position descriptions. The total number of distinct job descriptions included in this study, by state were:

- Hawaii and Alaska 212
- Florida 59
- New York 98
- Oklahoma 141
- Washington 103

for a combined total of 613.

Project staff collected job descriptions from both traditional and non-traditional positions that fit the criteria established by the project staff for inclusion in the database. Positions in one agency were often duplicated by another agency. For example, an industrial hygienist in the Department of Transportation might also be reported by the Department of Labor Industries. For these positions the KSAs were identical indicating that many environmental health positions require the same KSAs irrespective of agency. The data were entered into the database so that agency-specific as well as cumulative trends could be analyzed. This nearly doubled the size of the final database.

Figure 1.1 depicts the percentage of all agency jobs sorted by general job type. Note that while almost 80% of the job descriptions called for applicants to have varying types of technical KSAs, almost all jobs called for applicants to possess other KSAs as well. Policy, regulatory, public relations and administration/management KSAs were the ones most frequently requested. The radar graph (fig. 1.2) depicts the same information, but broken down by each individual state. Note that while there |are variations among the six states, the overall pattern is fairly consistent. Oklahoma stands out in have relatively fewer public relations jobs than do the other states.

As expected, project staff found, in comparing the written descriptions published through the state personnel systems with the informal feedback by agency program personnel, that many of the job descriptions were outdated or failed to capture the KSAs that the program personnel were actually looking for in any specific hire. Additionally, some states have no foreseeable plan to modify these descriptions. Barriers such as the shortage of staff and expanding job scope were cited as impediments to expedient changes in job descriptions. For example, the State of Alaska is unable to review and update their position descriptions as often as they EC. Currently there is no standard cycle for the automatic review of their job options. The present process in Alaska requires the initiative of those responsible for filling positions within their departments. In the Alaska State system several departments may use a single job title/ class specification. Each department may focus indifferent aspect of the job description from that which is important to another department. This situation is not unique to Alaska.

When it comes to making changes to a class specification all departments or sections using a particular class specification have a stake in that position and therefore want to contribute to the design

Figure 1. General Job Categories

Figure 1.1. Bar Graph depicting cumulative distribution of job categories.

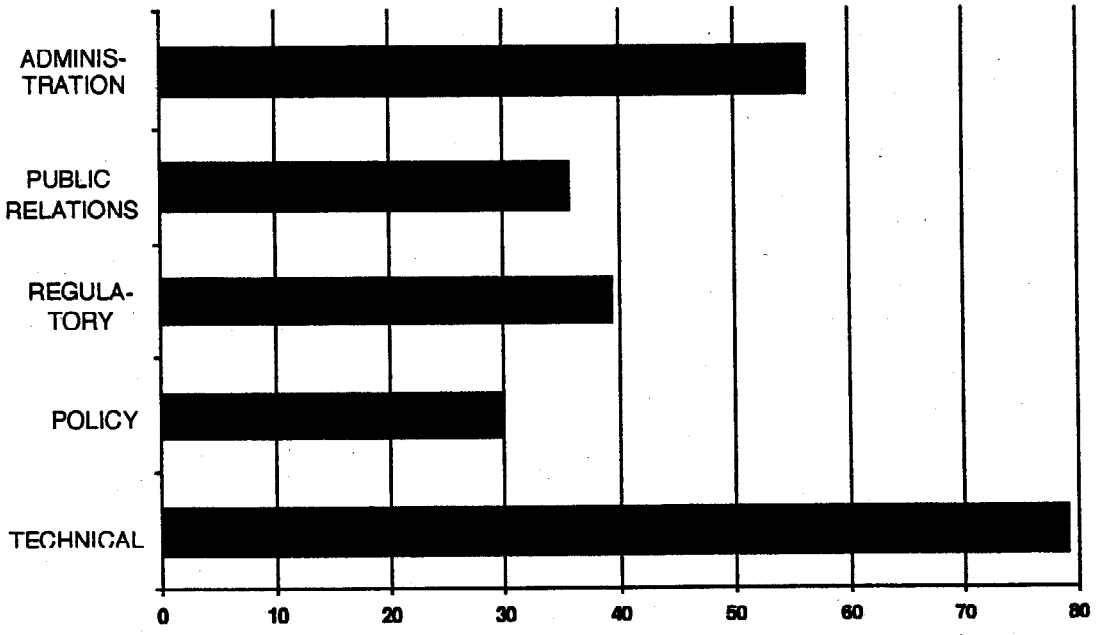
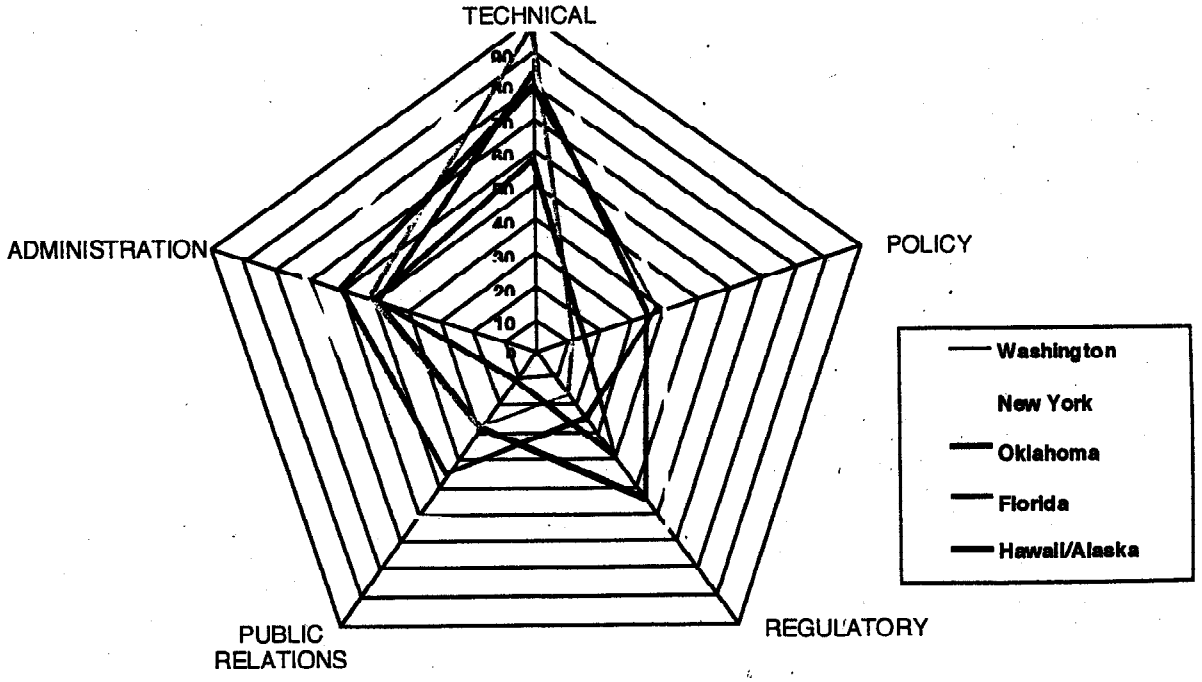


Figure 1.2 Radar Graph depicting general job categories by state.



and approval of the proposed changes. Currently, the major driving force behind changes in class specifications is from the departments and programs. Changes are only made at the request of these parties.

It is estimated, in Alaska, that the process from seeking input for changes to approval and adoption of the changes to a class specification takes 2 to 3 years, if no major problems occur.

Another factor that hinders a timely review of the job is that the review procedure typically requires consensus among the programs affected by the changes before a new description can be approved. Beyond the mere complexity of updating a class specification, seeking the endorsement of all the programs involved almost guarantees that the process will be slow and time consuming. Alternative methods suggested include creating separate department sub-classes of a job description or a program-specific class specification that is unique to that program alone. Nonetheless each of these methods also present their own challenges. Budget cuts have affected the ability of the personnel or human resources office to conduct timely reviews of their descriptions. **In many instances the class specifications were over 20 years old.**

By contrast, the project staff from Hawaii noted that the City and County of Honolulu job descriptions were changed quite frequently. This may be a function of the smaller numbers involved (25 City and County of Honolulu descriptions were included in the study while there were 94 entries for the State of Alaska and Alaska Native Health Service). Instituting changes for the cities and counties with fewer job descriptions and fewer agencies might be a relatively simpler task and therefore easier to undertake at more frequent intervals.

However, small size is not the only factor that facilitated timely job description changes. Washington State, which had 104 job descriptions in their study, was, at least occasionally, able to respond to needed changes in job descriptions. The Washington Department of Personnel writes announcements with significant input from the agencies; the amount of inter-agency cooperation in formulating the job description depends on how technical or specific the position is or how often it is opened. Some positions are rarely changed; others are changed up to 60 times a year, or every time they are opened. The Department of Personnel tries to be very responsive to agency needs and prides itself in becoming a very customer service oriented agency.

The fact that a number of the class specifications and job descriptions were out of date did not hinder the project's ability to complete job description questionnaires, however, it did present some challenges for the analysis and interpretation of the data. Simply documenting the aged characteristic of many of the position descriptions was a significant finding in itself.

In several states the human resources office is the first to decide if an applicant meets the basic qualifications for the job as stated on the class specifications. If the class specification no longer adequately fits the position then it is likely that the applicants will also not be screened correctly to fit the position. Many of the outdated class specifications did not recognize the relevance of a Master of Public Health degree where such an applicant would be highly desirable (based on the project staff's knowledge of the development and growth in the program's areas under consideration). It is very

possible that a truly qualified applicant will fail to make the first cut and be removed from further consideration by the human resource department ending that applicant's chances for additional appraisal and employment The human resource department can only base their decision on the criteria that appears on the class specification.

The project staffs found that several states recognize the shortcomings of their current systems and are examining ways in which they can improve the accuracy and prompt review of their job descriptions. New York is currently overhauling their civil service system. It will be a long-term process. Many positions have been or will be eliminated through consolidation and budget cuts. Titles are being reworked so that jobs in different consolidation and budget cuts. Titles are being reworked so that jobs have the same title. The overall trend is towards a more generalized title series followed by an evaluation of a person's particular knowledge, skills, and abilities (KSAs) with the needs of a specific position. Within departments various agencies employ individuals that would fall under the umbrella of Environmental Health.

In Hawaii, Department of Health, Environmental Health Division also realizes the obsolete nature of their class specifications they recently contacted this project for additional information. Although the project did not stimulate the changes in the class specifications, it was instrumental by adding momentum to their process**. The process of updating these class specifications has just begun and could possibly take years to complete the entire set.**

In an increased effort to streamline human resource procedures and make their human resources system user-friendler, the Washington Department of Personnel is currently developing a program where an individual can apply for all the positions that he/she is qualified for with just one application. The Department of Personnel will be reviewing the final state report as part of their on-going process to evaluate performance.

Formal Education

Most job descriptions specified that the applicants hold some level of academic achievement – usually a baccalaureate degree. The data was analyzed for trends in both degree level and specific academic majors. (See figures 2 through 4 on the following pages.)

Bachelor degrees in engineering were the most often requested or required degree (48.4%). Thirty-nine percent of the positions in Oklahoma and 20% in Florida required a bachelor's degree in engineering. Masters degrees were rarely requested or required in Hawaii (6%); however, each of the positions that did require a masters degree required that the advanced study be completed in an engineering field. Chemistry (27%) and biology (27%) were often required in New York. Florida requested geology (27%) and biology (17%).

1. Alaska: Bachelor degrees in environmental science (20%) and environmental health (18.9%) were the second and third most designated degrees in Alaska. Just over 7% of the positions were willing to accept graduates with a degree in any field. Seven areas required or requested masters' degrees, environmental health (18.9%), public health (8.4%), industrial hygiene (8.4%), environmental science (6.3%), Epidemiology (6.3%), toxicology (6.3%), and engineering (5.3%). Doctoral degrees

Figure 2. Education — Bachelor Degrees

Figure 2.1. Bar graph depicting the percentage of jobs requiring applicants to have various types of baccalaureate degrees.

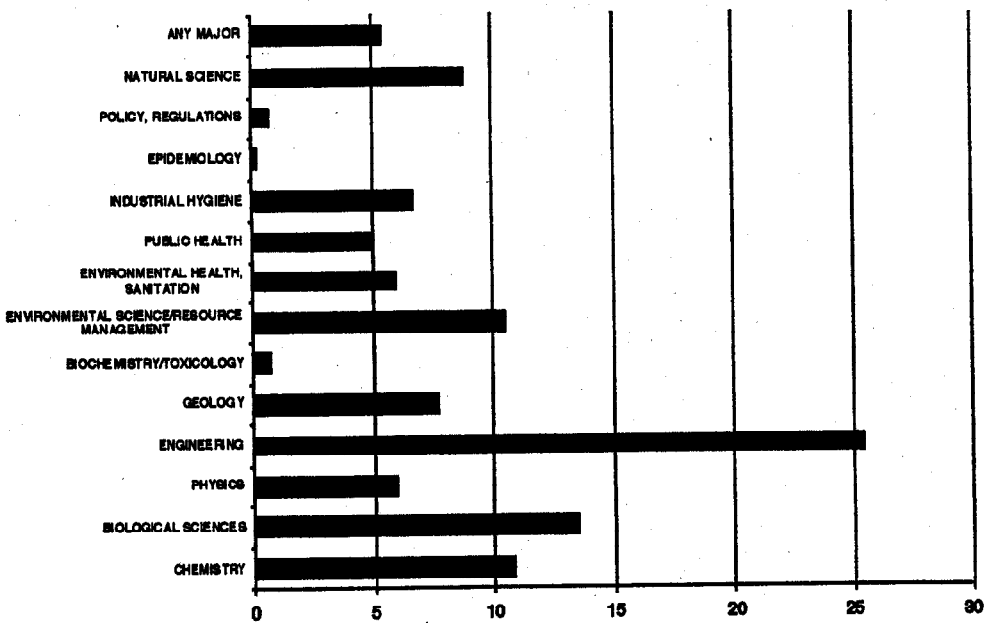


Figure 2.2. Radar graph depicting the percentage of jobs requiring applicants to have various types of baccalaureate degrees by state.

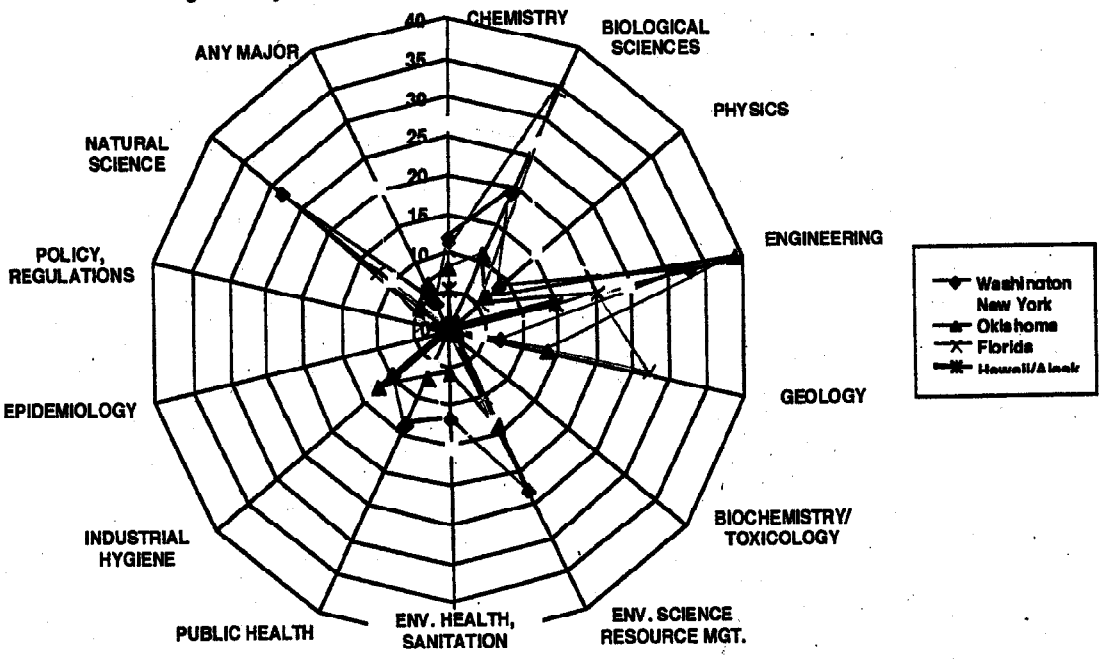


Figure 3. Education — Master Degrees

Figure 3.1. Bar graph depicting the percentage of jobs requiring applicants to have various types of master level degrees.

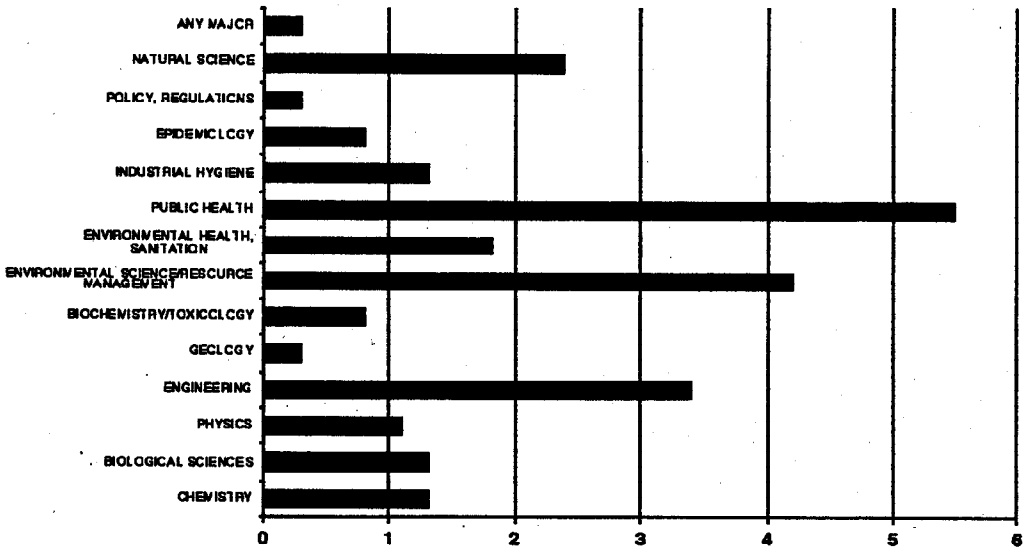


Figure 3.2. Radar graph depicting the percentage of jobs requiring applicants to have various types of masters degrees by state.

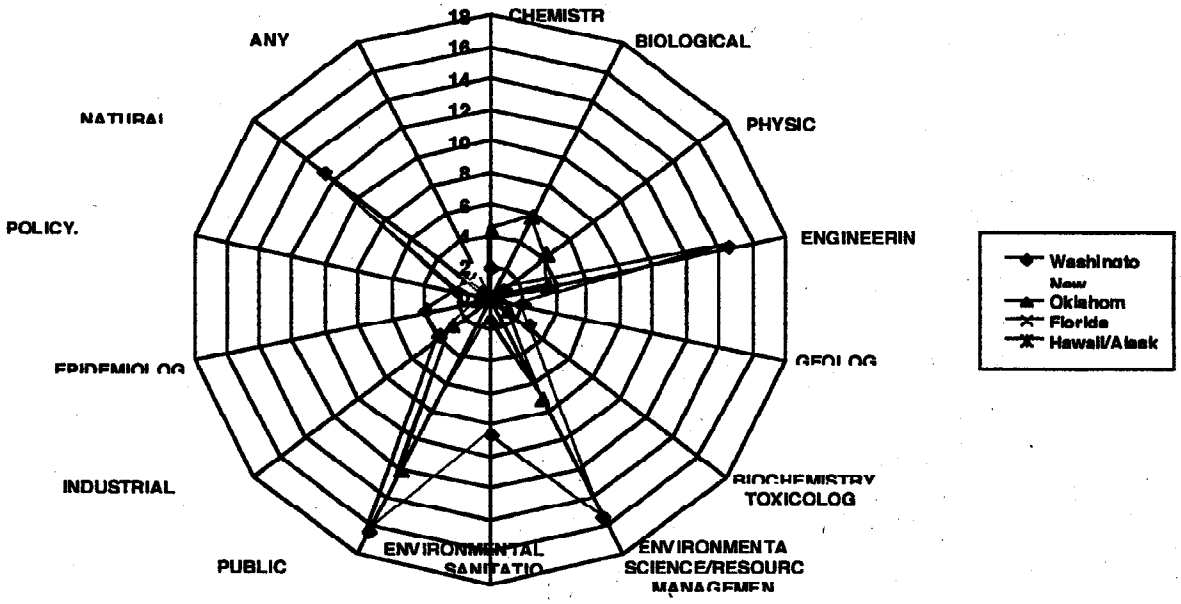


Figure 4. Education — Doctoral Degrees

Figure 4.1. Bar graph depicting the percentage of jobs requiring applicants to have various types of doctoral degrees.

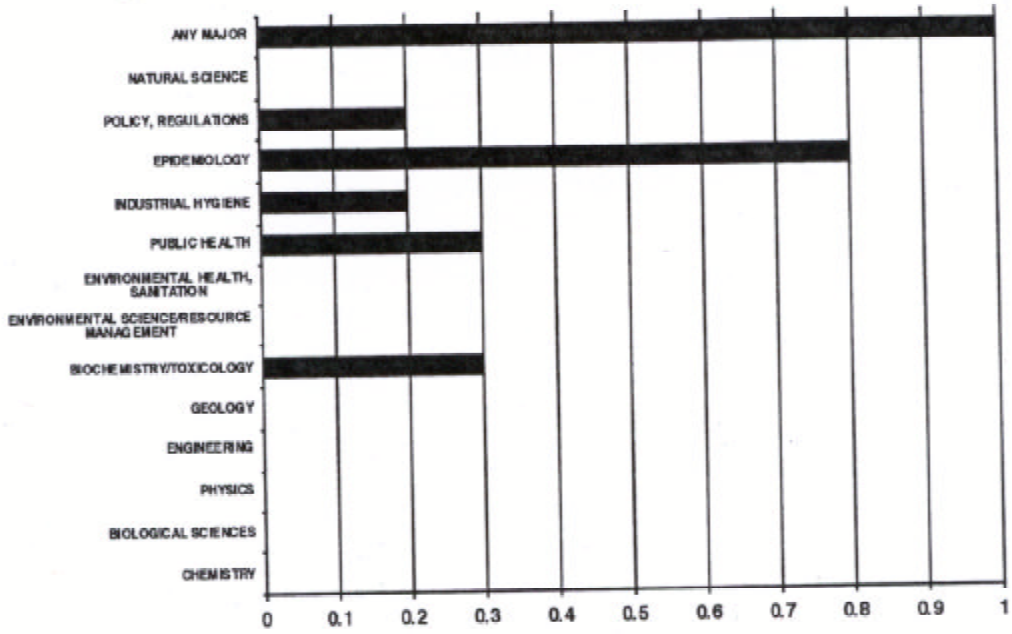
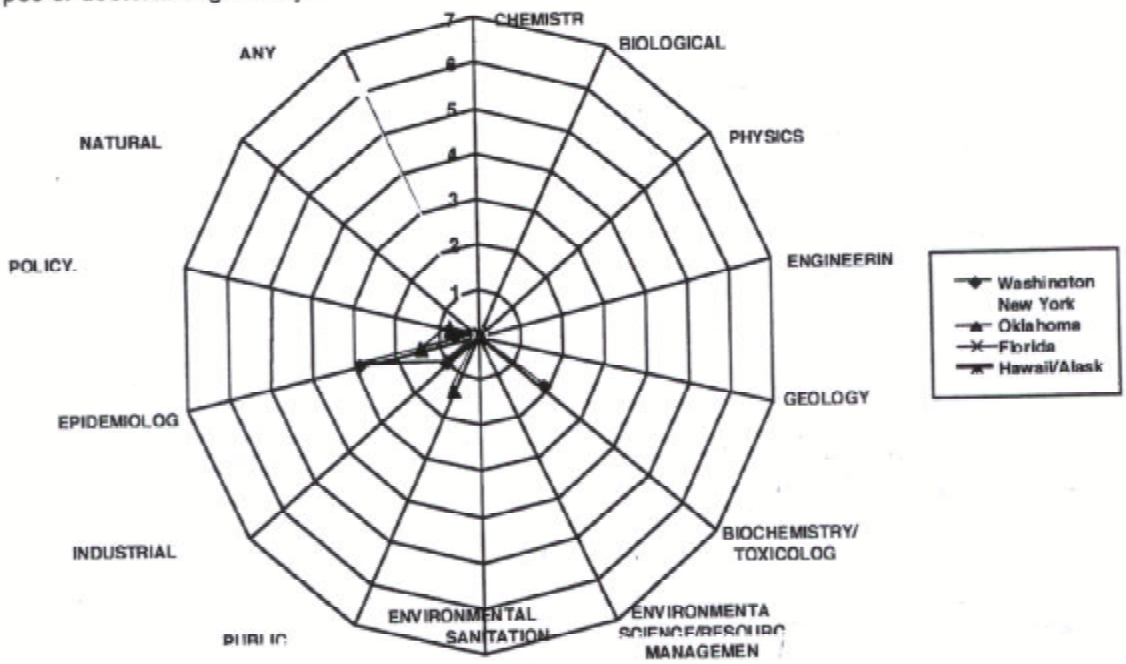


Figure 4.2. Radar graph depicting the percentage of jobs requiring applicants to have various types of doctoral degrees by state.



were not required by any the reviewed positions.

2. Florida: Bachelor degrees in geology (27%) and engineering (20%) were the first and second most designated degrees in Florida. Only Natural Sciences required a masters degree (1.7). Doctoral degrees were not required by any of the reviewed positions.

3. Hawaii: For Hawaii jobs, degrees in chemistry were the most often requested or required. Biology (29%) and physics (27.4%) degrees were the second and third most sought after degrees. Degrees in public health, environmental health, and industrial hygiene were recognized as relevant by 23.9%, 21.4%, and 21.4% respectively. Over 22% of the positions were willing to accept graduates with a degree in any field. A surface examination indicates that a college degree in any field is just as valued as a college degree in an environmental health discipline. Like Alaska, doctoral degrees were not required by any of the reviewed positions.

4. **New York:** Bachelor degrees in biology (27%) and chemistry (27%) were the most designated degrees in New York. Twenty percent of the position required a bachelors of engineering. Neither masters nor doctoral degrees were required by any of the reviewed positions.

5. Oklahoma: The Oklahoma education requirements for the identified positions ranged from holding a high school diploma to a Ph.D. Six percent of the positions required a bachelors in environmental health and 12% of the positions required bachelors in environmental science. It is of interest to note that 73% of the positions required only a bachelors degree — unspecified by any major. However, of the positions requiring formal education in public health, 63% required a masters degree.

6. Washington: In Washington, the data show that the majority of the positions—require a degree in the "other" category (60%). Natural sciences (37%) degrees were repeatedly required. While Epidemiology (0%) and toxicology (1%) were hardly ever if ever sought.

In addition to formal education, a few jobs required applicants to possess, or be eligible to obtain, special licenses or certifications. However, as depicted in figure 5, the most common license was a valid drivers license.

Relatively few of the positions required licenses/certifications at the time of the initial hire. Very few jobs required the applicants to be registered sanitarians (RS) or environmental health specialists (REHS), or certified industrial hygienists (CIH). However 8% of the positions did require certification as a professional engineers (PE).

Job Content

The 'job content' category was defined as the specific program(s) or work area(s) that were involved in a particular job. The printed job descriptions specify one or more environmental health or related technical program areas. For the most part these correspond to the program areas identified in the 1980 NEHA Role Delineation Model. However, a number of additional categories were added to

reflect the variations among and between states and agencies where it was felt necessary to preserve the integrity of data set. The categories included in this study were:

- Air Quality
- Drinking Water
- Environmental Noise
- Hazardous Substances
- Injuries
- Land Use
- Natural Sciences
- Occupational Health & Safety Act
- Environmental Noise
- Radiation
- Soil Contamination
- USDA Inspections
- Water Resources
- Animal Waste Management
- Environmental Laws
- Food Quality/Safety
- Housing
- Institutional Health
- Liquid Waste
- Occupational health
- Pesticides
- Public Health Laws
- Recreational Waters
- Solid Waste
- Vector Control

Water resources (27%) and drinking water (25%) were the most often requested knowledge areas in this study. Air quality, hazardous waste, and liquid waste (each 20%) were also the focus of many job descriptions. (See table 1 below.)

Figure 6.1 presents the same data in graphical form, however, only those program content areas which were specified in 10% or more of the job descriptions are included in this figure. For the most part, those areas not represented on this figure could have been legitimately combined with one of the program areas depicted. However, Housing (4%), Land Use (9%) and Injuries (9%) are examples of important environmental health program areas which were not typically subsumed under other program areas. Figure 6.2 provides the breakdown by state.

1. Alaska: Knowledge of drinking water was the most highly desired knowledge content area in Alaska with 57% of the job descriptions listing this program area as the required (or one of the required) content areas. The Alaska Area Native Health Service also desired personnel with knowledge in this area (54%).

Other frequently required job content areas for the State of Alaska included air quality (43%), and hazardous substances (37%). The Alaska Area Native Health Service had different priorities after drinking water; these included occupational health (52%), radiation (52%), and injuries (50%).

Figure 5. Licenses and Certifications

Bar graph depicting the percentage of jobs requiring applicants to have a specific license or certification.

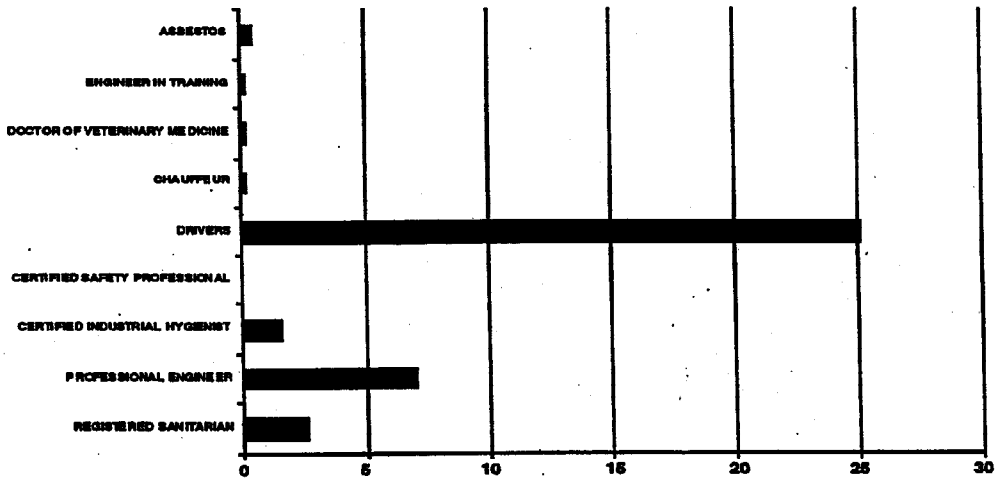


Figure 6.2 Job Content – By State

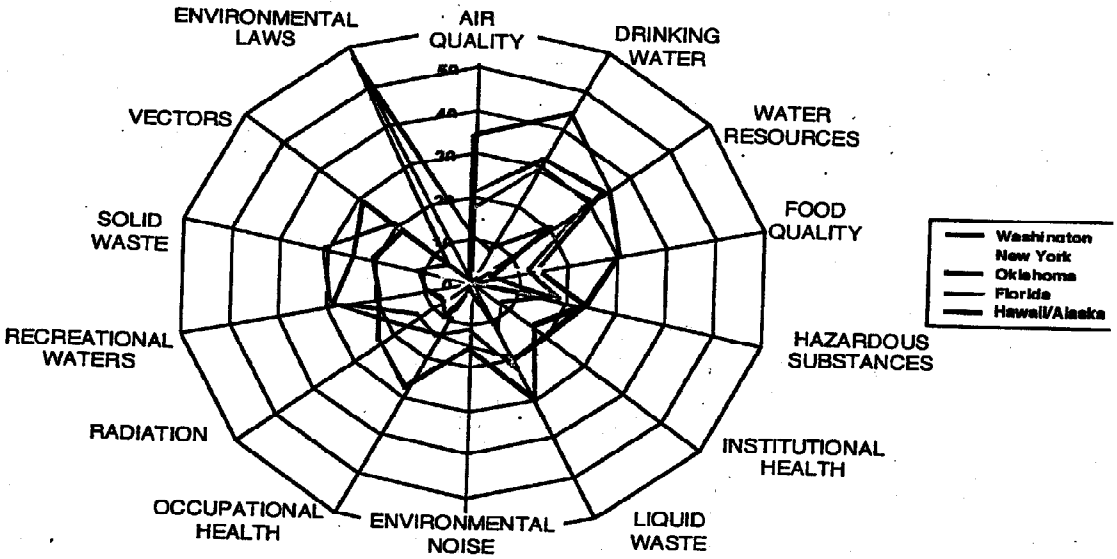
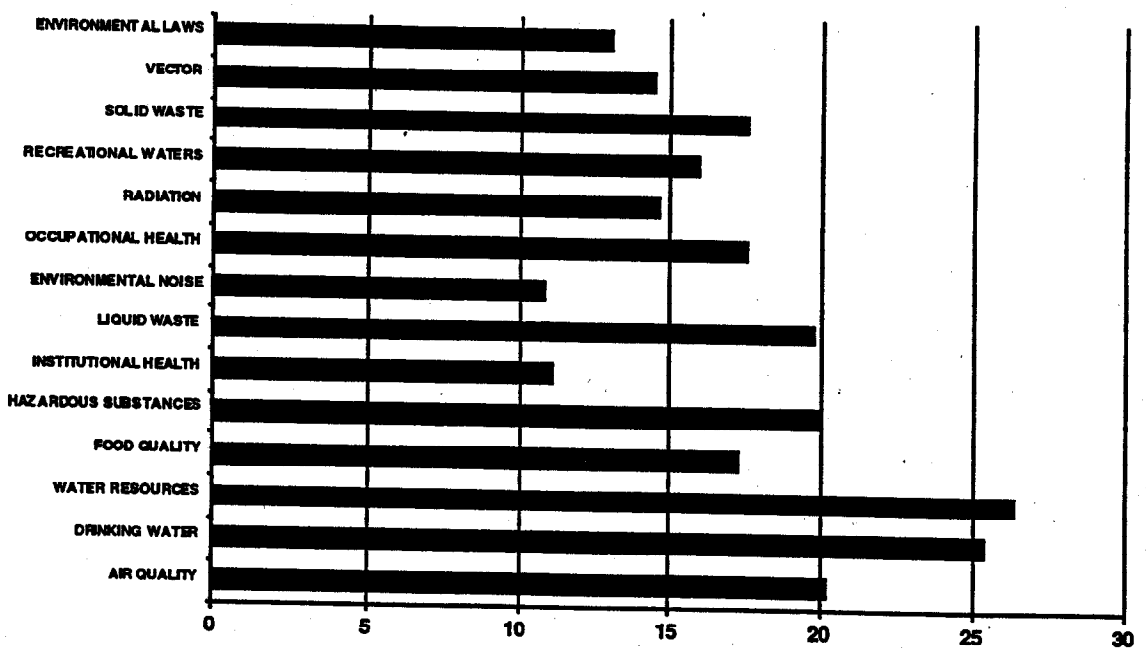


Table 1. Percentage of Job Descriptions by State Requiring Applicants to Have Knowledge or Experience in Specific Job Content Areas

Job Content Area	AK	FL	HI	NY	OK	WA
Air Quality	43	17	36	7	11	20
Drinking Water	57	30	37	14	8	32
Water Resources	37	29	36	4	20	33
Recreational Water	10	29	14	0	9	28
Food Safety	35	12	42	14	4	14
Haz. Substances	37	17	16	12	16	25
Housing	2	0	13	7	1	4
Injuries	0	0	5	7	1	18
Institutional Health	0	12	14	6	9	20
Land Use	4	17	2	4	11	17
Liquid Wastes	35	24	27	2	13	20
Env. Noise	8	12	20	6	2	16
Occupat. Health	2	15	36	10	10	15
Radiation	6	14	26	5	7	18
Solid Wastes	31	31	18	6	11	24
Vectors / Zoonotic	12	20	0	2	6	28

Figure 6.1 Job Content - Cumulative Data



2. **Florida:** Florida required water resources (30%), drinking water (29%) and recreational waters (29%), and solid waste (31%) most often.

3. **Hawaii:** Drinking water knowledge was highly desired in Hawaii (36%). The State of Hawaii also emphasized air quality, and occupational health (both 36% each) as well as food quality (42%). City and County of Honolulu also cited recreational waters, and water resources (both at 31%) as frequently required job content areas. The City and County of Honolulu jobs required liquid waste knowledge for more than half of their positions. (58%)

4. **New York:** In New York, perhaps reflecting a more general, single statewide personnel structure, there appears to be less of a preference for one program area over another. The two most often sited programs were food quality (14%) and occupational health.

5. **Oklahoma:** Twenty per cent of the positions in Oklahoma emphasized a need for expertise in water resources. Fifty-six of the positions (40%) in Oklahoma emphasized environmental laws and regulations while 25% of the positions emphasized a focus on public health laws. This trend is unique to Oklahoma as no other state requested this category to the same extent. The Oklahoma Office of Personnel Management did not define public health or environmental law. Beyond these categories, job content varied widely based on the agency and specific position.

6. **Washington:** In Washington it was found that there was a heavy environmental health component in the positions reviewed, even when the agencies did not view themselves as primarily a public health agency. The high number of responses in the "other" category (55%) can be attributed to the inclusion of agencies and positions not traditionally considered being in the environmental health field. An understanding of water resources (33%), drinking water (32%), recreational waters (28%) vector/ zoonotic diseases (28%) and hazardous wastes (25%) were also often requested.

Job Process Skills

The "job process skill" category refers to functional knowledge and skills, i.e./ specific knowledge and skills, about or related to environmental health, but not necessarily associated with a particular program area as in the job content KSAs. (See figure 7 and table 2.) Included are the areas of policy making, sampling, laboratory analysis, facility operations, litigation, site inspection, educational theory, grant writing, permitting, regulations, administration, public relations, and conducting research.

Sampling (43%) and education (38%), which in this context was taken broadly to include training/ technical communications and general communications skills, were the most highly desired competencies, followed by inspections (33%).

1. **Alaska:** Educational skills were most often requested skills (47%) in the state of Alaska. Administration was highly desired in the Alaska (53%), as well as in the Alaska Native Health Service (80%). The State of Alaska (49%) also stressed the importance of public relation skills. The Alaska Area Native Health Service often required applicants to have knowledge in facility operations (65%), and audits/environmental impact statements (43%).

Figure 7. Job Process Skills

Figure 7.1. Bar graph depicting the percentage of jobs requiring specific knowledge and skills, about or related to environmental health.

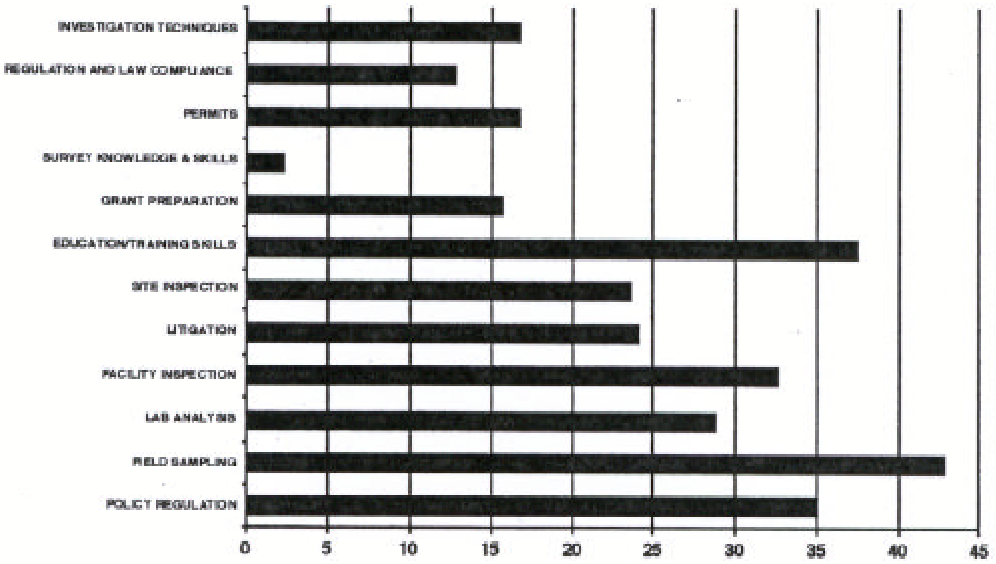
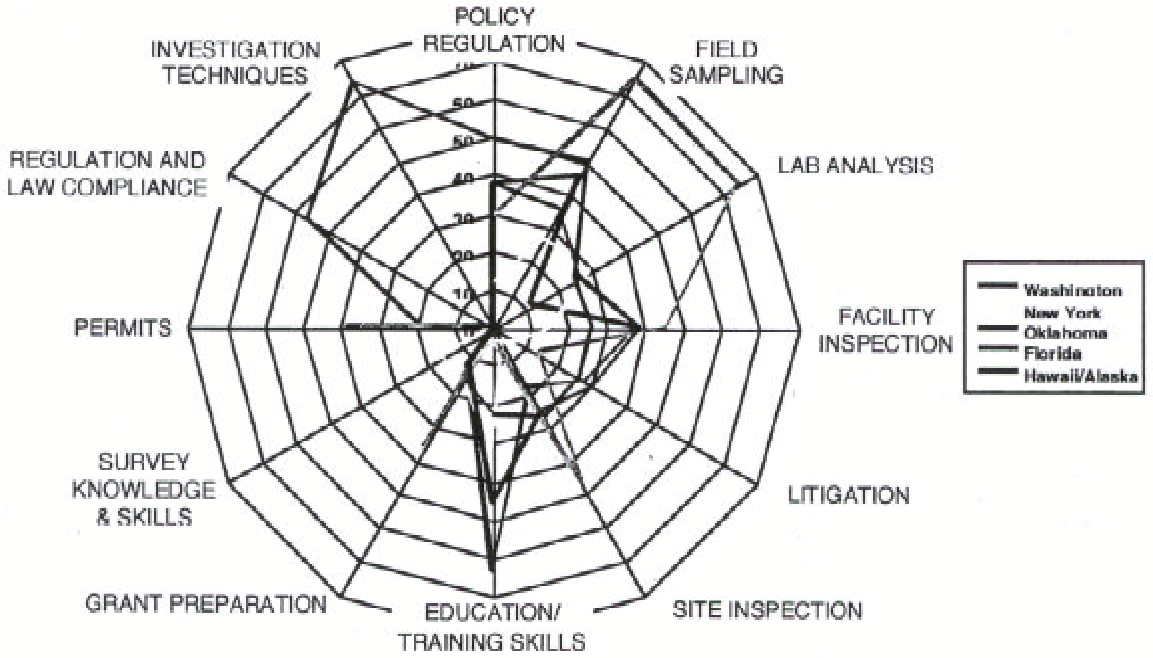


Figure 7.2. Radar graph depicting the percentage of jobs by state requiring specific knowledge and skills, about or related to environmental health.



2. Florida: Florida was the only state that routinely specified both required and desired knowledge and skills in their job descriptions. Thus, their findings highlighted some unique trends. Education and method skills were the lowest, required knowledge areas (3% each); Florida jobs mainly focused on sampling (75%), laboratory analysis (75%), environmental audits (48%). Desired knowledge areas were largely those involving policy, litigation, and facility operations skills. In contrast to the other states, education and method skills were seldom identified as either required or desired skills. It appears these skills are not seen as that important.

On the other hand, although policy was not often listed as a required skill, it was highly sought as a desired skill. Conversely, although sampling ranked high as a required skill it ranked low as a desired skill. This disparity brings to light the possibility that what may be required in a formal job may be different than what is actually being done.

3. Hawaii: Education and method skills were highly sought in Hawaii (46%), as were administration skills (54% in the state and 58% in the City and County of Honolulu). Sampling, facility operations and laboratory analysis all tied for the third most required knowledge area in Hawaii, each at 42%.

4. New York: New York state jobs tended to stress the importance of education methods (33%), field sampling techniques (27%), and laboratory analysis (30%).

5. Oklahoma: Oklahoma's job descriptions stressed the importance of inspections (73%), sample collection (50%), and policy formulation (49%).

6. Washington: Technical skills, like those used in laboratories (12%), seem to either be assumed or not as valued as education (63%), administrative theory and practice (39%), and knowledge of regulations (54%). Sample collection (45%) was also often required. Groupings of competencies show that nearly half the participating agencies (48%) in Washington required their employees be proficient in the following administrative and policy skills: administrative theory and practice, knowledge of regulations and policy formulation. More technical/research orientations like site characterization-Environmental Impact Statement (EIS) preparation and laboratory skills were required in less than 15% of the jobs.

Job Tools

The category 'job tools' included budgeting, interpretive skills, engineering, management, creativity, organizational ability, problem solving, quantitative, and information system skills. Interpretive skills (74%) were the most often cited skill across the states, followed by problem solving (66%) and organizational skills (57%).

Also included here were communication skills. Communication skills included report preparation, written, verbal, presentation preparation, and presentation delivery skills.

Table 2. Percentage of Job Descriptions by State Requiring Applicants to Have Knowledge and Skills in Specific Functional Areas

Job Process Area	AK	FL	HI	NY	OK	WA
Sample Collection	31	74	40	27	50	46
Educational Skills	47	3	46	33	23	63
Policy Formulation	35	29	43	11	49	37
Facility Operations	27	46	32	15	26	38
Lab. Analysis	29	75	34	30	25	12
Litigation	29	14	45	7	26	28
Site Inspection (EIS)	24	48	23	4	27	18
Permitting	14	33	10	1	19	38
Inspections	0	0	0	0	73	0
Grant Writing	8	36	15	15	16	13

Table 3. Percentage of Job Descriptions by State Requiring Applicants to Have Specific Skills or Job Tools

Job Process Area	AK	FL	HI	NY	OK	WA
Interpretive skills	86	53	78	66	75	92
Problem solving	49	98	67	50	43	97
Organizational skills	33	81	60	37	53	97
Managerial skills	53	51	62	47	59	57
Quantitative skills	49	88	44	52	48	63
Creativity	20	71	41	13	3	83
Budgeting skills	31	14	26	4	22	29
Information systems	16	37	1	13	8	74
Engineering skills	27	25	13	1	27	12

Figure 8. Job Tools

Figure 8.1. Bar graph depicts the percentage of jobs requiring the applicants to possess certain generic knowledge, skills or abilities, or experience.

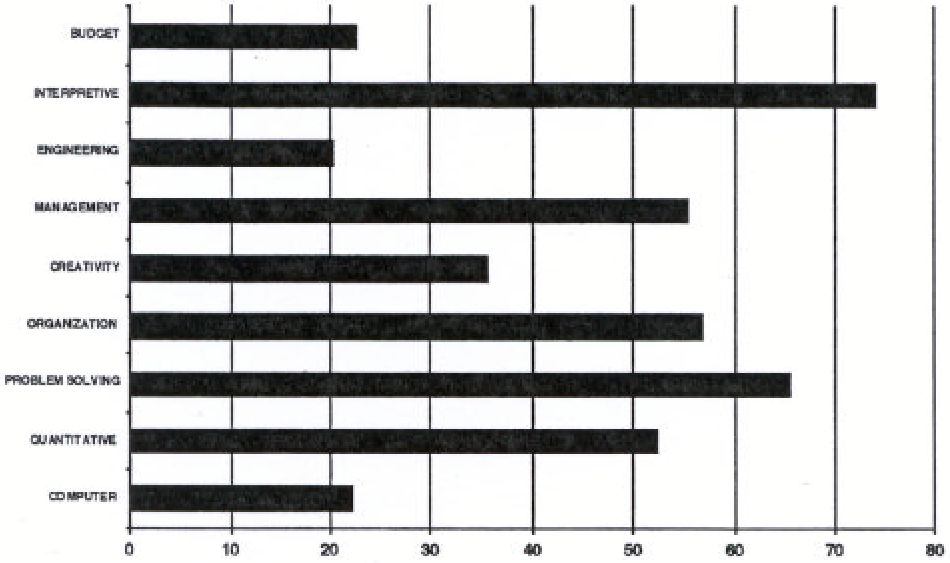
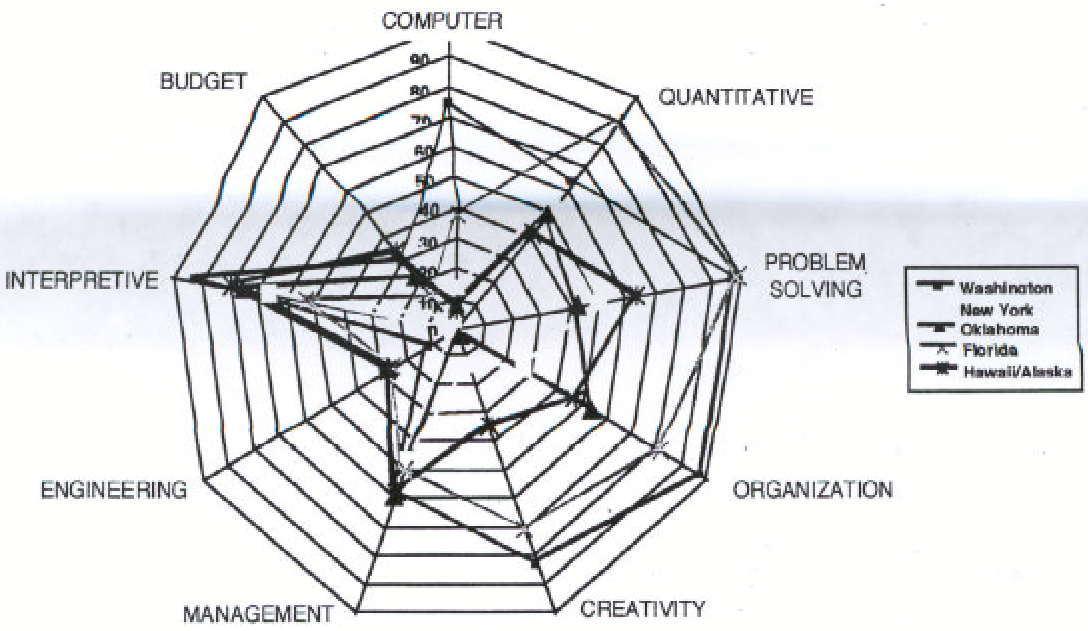


Figure 8.2. Radar graph depicts the percentage of jobs requiring the applicants to possess certain generic knowledge, skills or abilities, or experience by state.



Skills that cut across program areas, like organization, problem solving, interpretive skills, and creativity are skills not specifically taught in environmental health programs. Considering that a majority of the job descriptions called for problem solving, interpretive and organization skills, it can be said that it is indeed these attributes which employers are most eagerly looking for in their environmental health candidates. (See figure 8.)

1. **Alaska:** Alaska often required applicants to have developed skills in interpretation (86%), management (53%), problem solving (49%), and computation skills (49%). The Alaska Area Native Health Service required most applicants have acquired interpretive skills (83%) and management (65%). Verbal (84%), written (82%), and report preparation (82%) skills were the three top communication skills required for State of Alaska positions. The results for the Alaska Area Native Health Service were very similar, written skills (98%), verbal skills (96%), and report preparation skills (83%) were also the most often required communications skills.

2. **Florida:** Problem solving skills are most often required in Florida (98%), followed by computation skills (86%), organizational abilities (81%) and interpretation skills (53%).

The emphasis of required communication skills in Florida was on verbal (100%), written (98%) and report preparation skills (86%). Presentation delivery (66%) and preparation (64%) were moderately required.

3. **Hawaii:** Hawaii's most required skills were interpretation (78%) followed by problem solving (67%), management (62%), and computation (50%). The City and County of Honolulu also often required applicants to have developed skills in interpretation (62%) and problem solving (42%).

Report preparation skills were the most (92%) sought after for State of Hawaii jobs. Written skills, at 91% was a very close contender for the most required communication skill. Also important for 85% of the positions were verbal skills. The results for the City and Country of Honolulu are very similar to those for the other agencies. Verbal and written skills were the most (88% each) required communication skills followed closely by report preparation skills (85%).

4. **New York:** Interpretive skills were most often required in New York (66%) followed by quantitative skills (52%), problems solving (50%), and management (47%). Similar to the state of Washington, engineering degrees were required 25% of the time and yet engineering skills were required only 1%.

In New York 70% of the positions required written skills, 33% wanted verbal proficiency and 35% asked for the successful applicant to be able to prepare a report.

5. **Oklahoma:** Interpretative skills (74%), topped Oklahoma's employers requirements. Quantitative skills were asked for 48% of the time in Oklahoma followed by problem solving (42%). Verbal and written skills in Oklahoma were required in the majority of positions 85% and 94% respectively. Report preparation was widely emphasized with 85% of the positions requiring this skill.

6. **Washington:** Problem solving was highly desired by Washington (97%), interpretative skills

were often asked for (92%), so were organizational skills (63%). Computation skills (63%) were highly valued in Washington as well. It is interesting to note that although engineering degrees are highly sought after, in the state of Washington according to our findings engineering skills (12%) are least often required.

Ninety-six percent of the positions in Washington reviewed required verbal skills/ while 98% require a good writing ability. Ninety-five percent required their employees to be able to write a quality report while 76% required presentation preparation skills, 75% expected their employees to be able to deliver presentations.

Communication and Leadership Skills

Two skill areas, which were highly desired to some extent in almost every job category and in all states, were the areas of technical communications and training, and leadership and interpersonal skills.

Communications skills were desired across the board, however, within the broad area of communications, the ability to effectively convey information both orally (82%) and in writing (91%) were specified in almost every one of the job descriptions. Report preparation (80%) was also consistently ranked with oral and written communications. Other communication skills, like training, and the preparation and delivery effective presentations were also highly sought, although not as uniformly among the states. Figure 9.1 and 9.2 present the summary data for the overall ranking of these communications skills and depict the variation among the states included in this study.

Interpersonal and leadership skills are also highly sought after skills. Within this category are included skills in program development, public relations, teamwork, team leadership and socio-cultural awareness, as well as the ability to work individually. At first glance, some of these may seem incongruous. For instance Florida placed equally high value on both teamwork and the ability to work individually. However, taken as a whole, it becomes clear from the data presented in figure 10 that many agencies are looking for leaders — leaders who are self motivated, can take on a program or project and run with it. They are also looking for leaders that can work within a group structure and have the ability to relate well with individuals both within and outside of their organization.

Agency Type

The comprehensive database was segregated into the following agency types: Health, Environmental Protection, Agriculture, Labor, Personnel, Natural Resources, Transportation, and Other. The general “other” category was created for those job descriptions originating from agencies that did not fit into any of the aforementioned categories and did not appear often enough to justify their own category.

Roughly forty percent (37%) of the project job descriptions fell into the ambit of traditional environmental health agencies. This is especially noteworthy considering only a few decades ago almost all of these positions would have been placed within a health agency. Departments of Environ-

Figure 9. Communications

Figure 9.1. Bar graph depicting the percentage of jobs requiring the applicants to possess good communications skills.

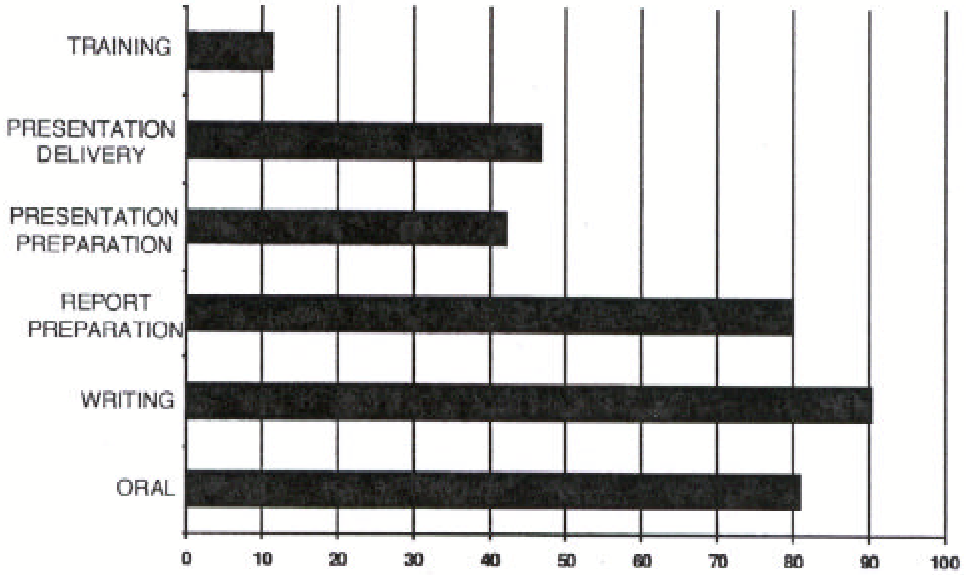


Figure 9.2. Radar graph depicting the percentage of jobs requiring the applicants to possess good communications skills by state

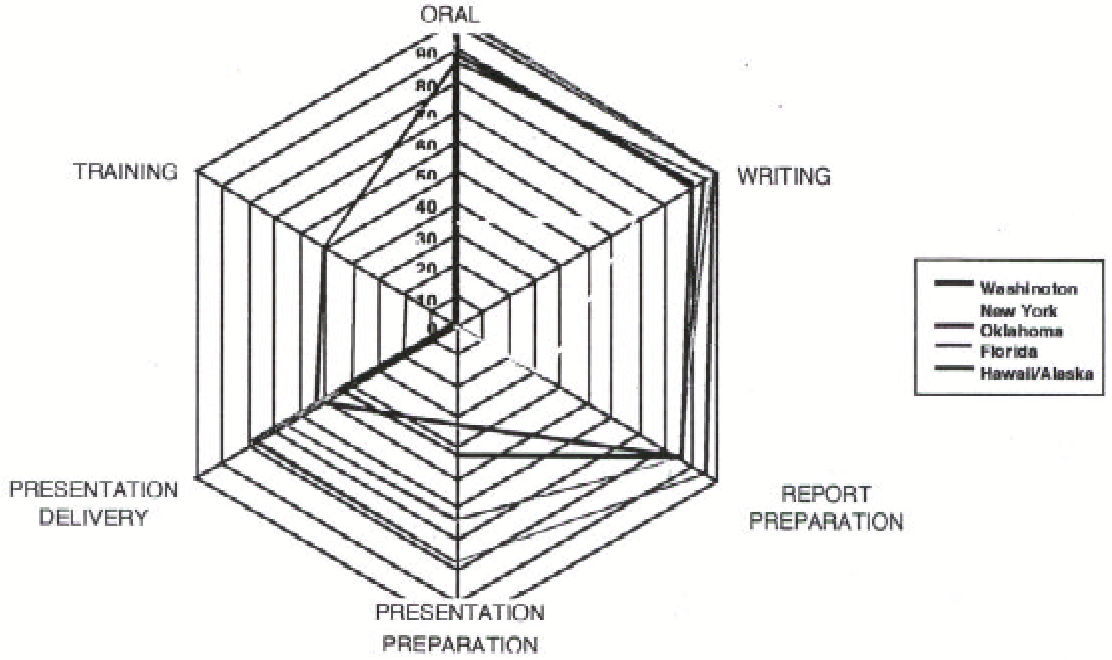


Figure 10. Leadership / Interpersonal Skills

Figure 10.1. Bar graph depicting the percentage of jobs requiring knowledge, skill or experience in interpersonal relations and/or leadership.

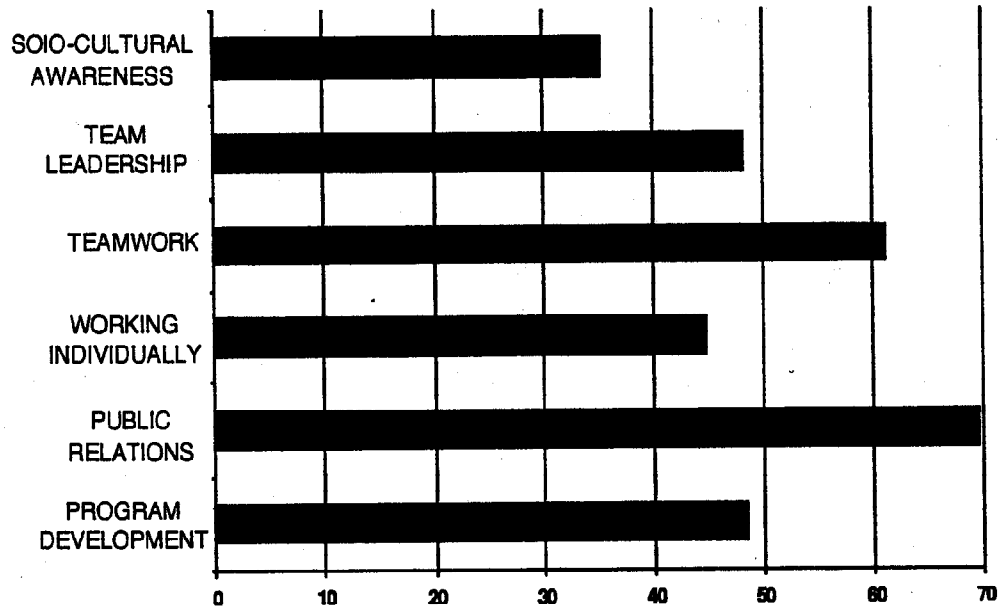
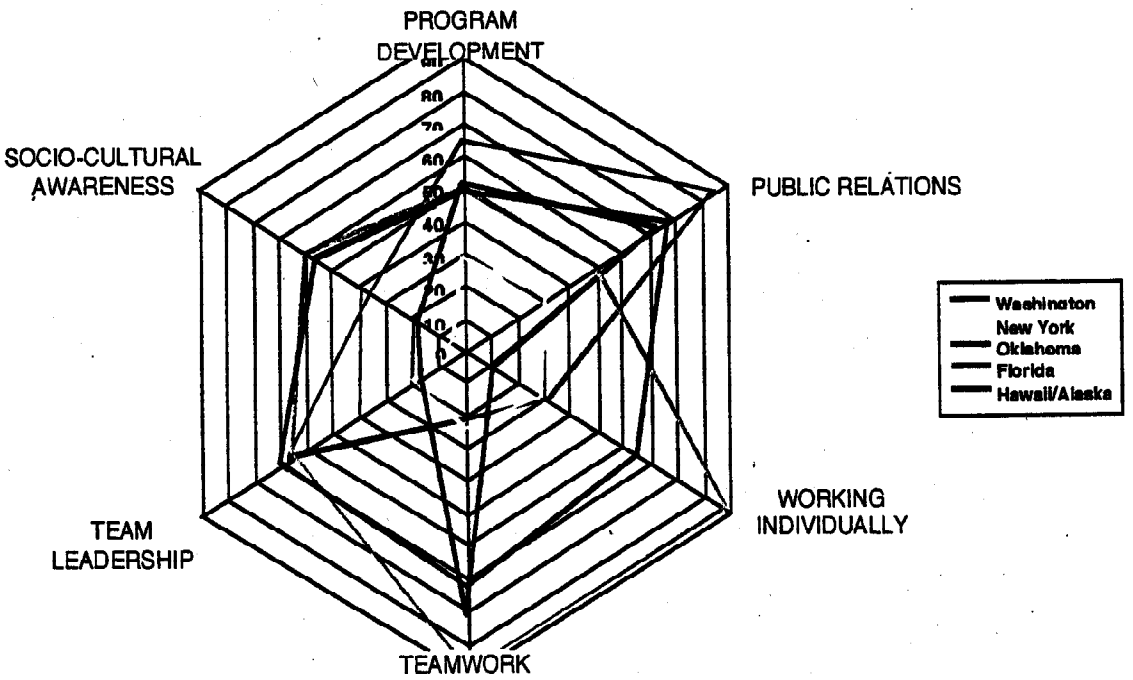


Figure 10.2. Radar graph depicting the percentage of jobs requiring knowledge, skill or experience in interpersonal relations and/or leadership by state.



mental Protection, which were created as an outgrowth of the environmental movement in the 60s and 70s, have absorbed 14% of the position types. Departments of Natural Resources, which in many cases have evolved from earlier conservation departments, comprised another 8%. Agriculture accounts for another 9% and Labor, Transportation, and Personnel account for 6% each. The remaining 14% were allocated to a variety of different types of agencies and were grouped under the heading of "other". These agencies range from military affairs to education, illustrating that there is an environmental health component in many agencies.

General Categories

As part of the job description questionnaire each of the positions was categorized into one or more of the following:

- Technical - having to do with an exact scientific procedure;
- Policy - evaluation of current structure/regulations;
- Regulatory - enforcement of environmental health laws;
- Public Relations - communicating with the public; and,
- Administration - managing resources.

Many jobs were classified in more than in one category. Most jobs were considered at least partly technical. This means that 78% of the job descriptions were designated as either solely technical or partially categorized as technical in combination with one or more of the other classifications. More than half (55%) of the jobs were designated as administrative. Thirty-nine percent, 35%, and 29% of the positions had a component of regulatory issues, public relations, and policy respectively.

Combinations

Many of the job categories overlap. Twenty-one percent were classified as solely technical. While 11% of the positions were considered both administrative and technical. Almost a tenth of the positions (9%) were classified as all five categories. Eight percent were both technical and regulatory jobs, while 5% were solely administrative.

Many job titles covered various levels of seniority — from level 1 which was normally an entry level position, to level 5 or administrator. Eighty percent of the positions that were classified as encompassing all 5 categories were managerial in nature, i.e., levels 4 or 5; while the majority of the positions that were considered only technical were trainee or entry level, i.e., levels 1 or 2. This trend may indicate that managers often hire "technical" applicants for entry-level positions, but those individuals must acquire public relations, policy, regulatory, and administrative skills in order to be promoted to managerial positions.

Less than 1% of the positions were classified as "Policy" positions and policy was found least often in combinations. This may signify that very few jobs are analyzing structure of environmental health programs but perhaps focusing on the technical aspects instead. This may be because in the current structure few positions are empowered to change their structure or that perhaps it is not part of

the current political paradigm.

Less than 1% of the positions focus uniquely on public relations, and public relations was found the second least often in combinations. This may indicate a lack of communications between environmental health issues and the communities that are affected most by environmental health effects.

Curricula Review

Curricula Review Questionnaire: The University at Albany project staff designed a Curricula Review Questionnaire that all the other project sites adopted to survey their own school's curricula. Project staff limited the survey to courses that were specifically oriented towards me environmental/ occupational health students. Courses that other public health students were likely or required to take were not included in the course review, e.g., Biostatistics, Epidemiology, etc., even though environmental and occupational health students were required or could include them in their academic program. The format of the Curricula Review Questionnaire closely followed that of the job description questionnaire. The Curricula Review Questionnaire was divided into 5 topic areas. Environmental Health Program Areas, Knowledge Areas, Job Skills, Communication Skills, and Leadership Skills. Each topic area listed all the relevant sub-topics within the parameter of the main topic. Each sub-topic was to be rated in three areas, lecture time, reading time, and time on assignment (homework and projects). In each of these three areas the professor was to estimate the amount of time they believed the course required in each subtopic. The time increments ranged from 15 minute blocks to blocks of a few hours. The largest increment of time was more than 6 hours. For example, a course in industrial hygiene, under *knowledge areas,* subtopic *sample collection,* the professor might estimate that the course would require more than 6 hours of lecture time, more than 6 hours of reading time, but require only 1-2 hours for time on assignment.

The existing curricula in the Schools of Public Health were surveyed by contacting all School of Public Health instructors teaching core Environmental Health courses. The survey was mailed to each faculty member and follow up was made by telephone. All core courses except one responded to the survey.

The survey was designed so that the amount of time that was spent on each of the KSAs could be estimated. The major variable was "time spent", which was the amount of time the course instructor expected students to spend on topics in class, studying (reading) outside of class, and on various assignments e.g. research papers, computer programming, statistical analysis, or developing presentations. All values are those reported by the course instructors.

At the end of the questionnaire there were a series of 5 yes/no and short answer questions. These questions probed the professors for information on the feasibility of curricula change and barriers to such changes, on the proficiency of this year's graduating environmental/occupational health students, on their interest in spending a day with a practitioner in an area relevant to their courses, and on their interest in participating in future faculty/agency interchange.

In order to impress upon the faculty the importance of the project's scope; project staff presented

the results from the analysis of the class specifications to the environmental/occupational health faculty. Hawaii appealed to their faculty to complete a curricula review questionnaire for each environmental/occupational health course they taught at the conclusion of the presentation. It was determined that 20 courses fit our criteria and should be surveyed for inclusion. Courses were not limited to only School of Public Health courses, several courses that are cross-listed in other schools within the university system were included (Medical & Veterinary Entomology, Water Quality Chemistry, Water Quality Biology, Water Quality Management, Research Seminar in Medical Geography, Industrial Hygiene Engineering, and Hazardous Materials Management).

1. Hawaii: Compliance by the University of Hawaii at Manoa School of Public Health environmental/occupational faculty in completing the Curricula Review Questionnaire was poor. Out of me 20 Curricula Review Questionnaire sent out only 8 were completed and returned. Approximately one month after the Curricula Review Questionnaire were sent out a reminder memo was sent out asking for the completed Curricula Review Questionnaire be returned as soon as possible. Shortly thereafter the semester ended, and like faculty at other research universities, many of the School of Public Health faculty are off campus conducting their own research projects making it more difficult to reach them. Deriving any meaningful interpretation from such a small sample size (n=8) seemed highly unlikely.

However, in terms of usefulness, this project could not have been conducted at a more opportune time. The University of Hawaii at Manoa School of Public Health has been concurrently undergoing its own school wide curricula review. The findings of this project will be helpful to me school in making the curricula more relevant to the real world of both public and private industries. The faculty can institute changes with confidence due to the knowledge gained from the job description part of the study. Instead of relying on their own personal knowledge, experience, and intuition they will be able to refer to the results of our project and know that the changes they make to their courses are in line with the knowledge, skills, and abilities identified in our study as desirable by the employer.

Using lecture only results (probably the most reliable reporting), the best covered Job Content KSAs were in drinking water, pesticides, and land use/conservation/EIS/Planning areas. Poor coverage was noted in food quality, environmental noise, occupational health, and vector control program areas. The “Job Process skills” best covered were policy regulation and sample collection protocol. Environmental site inspection was covered least well.

The “Job Tools” most well covered included quantitative skills (math statistics); problem solving and management skills; while engineering design skills were poorly covered. Communication skills appeared to be covered well in all areas.

Project staff at Washington distributed the Curricula Review Questionnaire to the core courses faculty. There was a very poor return of completed questionnaires. Due to the low number of questionnaires and thus faculty input the results in this analysis may be non-conclusive. Nonetheless they offer some interesting insights and some opportunities for further discussion. Fifty-eight percent of the faculty felt they lacked the time to add any additional components or subjects to their course load, but would be interested in learning more about agency activities and participating in a faculty agency linkage. One third (33%) of respondents felt that their students were proficient in both the technical and communications skills, while another 17% felt their students were proficient in technical skills.

2. Florida: Project staff experienced some difficulty in getting the participation of the faculty in returning curricula questionnaires. Therefore, a personal brief interview with the faculty was performed to gather information. Due to summer schedules only nine of 16 faculty were interviewed.

Of the survey forms that were returned it was found that 78% of the faculty felt that it was feasible for environmental health faculty to expand their curricula to incorporate skills, such as organization, planning and management, although some felt that in some courses they would not be an explicit part of the course. Only one faculty member felt that it would be too difficult to incorporate those into his course when he teaches courses that are technical. Fifty-six percent of the faculty felt that the students graduating this year were proficient in both technical and communication skills; 22% felt that the students graduating this year were proficient in technical skills. Only eleven percent felt that the environmental students graduating this year were proficient in communications. One professor suggested that it depended upon the specific degree that the students were pursuing.

All of the faculty interviewed have worked with state departments or other agencies. The following are some of me departments and agencies mentioned:

County Public Health Unit, State Department of Health, Water Management District, Department of Energy, World health Organization, National Institutes on Health, County Health Departments, Health and Rehabilitative Services, Centers for Disease Control private industry. Department of Labor, Division of Workers Compensation, Department of Environmental Protection, Department of Education, and US Coast Guard.

Sixty-seven percent of the faculty said that they were interested in finding out more about the activities specific agencies carry out and would be willing to spend a day in the field with a practitioner who works in their area of interest. One professor stated his only interest would be at the federal level. One suggested developing a booklet for internships and jobs available.

When asked what skills they felt were needed by today's students in order to go into the workforce, they responded as follows: 56% specifically mentioned a thorough background in technical skills; while 44% mentioned communication skills. Social skills were also mentioned as being necessary in order to be able to work in a group or team setting and to understand human behavior. The ability to think, to keep an open mind, to problem solve were also named.

When asked how their classes contribute to making students prepared for the workforce, the answers varied. Besides imparting knowledge and making them technically strong, some feel that they try to get their students to think and analyze problems in order to try to relate to a real work setting. Communication skills are also enhanced by presentation assignments. Multicultural diversity, team building, organization and leadership skills were also mentioned by the faculty members.

3. New York: In reviewing the College of Public Health curricula, it was apparent that the needs of the students are being met in terms of qualifying for environmental health positions, as the basic requirement in most instances is for the candidate to hold a degree, either bachelors or graduate from an accredited college or university in one of a family of specified areas. Given that many position descrip-

tions had evolved from a time when the term environmental health was synonymous with sanitary engineering, the BS in environmental health, MS or MPH in environmental health had to be shown an acceptable degree for programs where the original position description called for an engineering degree. This was true even though many of the positions did not require engineering skills *per se*. There were still some instances identified in agencies where a position required an engineering degree, but in discussion with the program director or supervisory staff it was clear that an environmental health practitioner would be fully capable of conducting the duties associated with the post.

4. Oklahoma: The Department of Occupational Health and Safety offers the MS, MPH, Ph.D. and DrPH degrees in environmental management, industrial hygiene/ environmental epidemiology, environmental toxicology, and a variety of combination majors. Due to the long standing and well established linkages between the only educational institution in the state offering these majors, and the small size of the agencies (compared to larger and more populated states), as well as the working relationship between the College faculty and the agencies, there is frequent opportunity to evaluate the existing curricula and update it as necessary to meet new challenges in environmental health education and training.

Each faculty member in Department was provided a copy of tine project findings and asked to respond to an internal survey regarding the degree to which, from their individual perspectives, the Department is meeting the needs of the students relative to qualifying for and being able to meet requirements of and perform successfully in the agency positions identified in the project. Based on the number of students placed in the agencies who are graduates of the program, and the number of agency employees returning to pursue advanced degrees in the Department, the opinions of the faculty indicated without exception that the mission is being met and that the curricula is appropriate to the task. It is also considered axiomatic that the curricula is a dynamic element and must be frequently reviewed for effectiveness.

The metrics typically used for measuring effectiveness include the rates of registration as environmental health specialists, certification as industrial hygienists, or other professional certifications achieved by program graduates. (Note: none of the positions identified required certification as a sanitarian, safety professional, or industrial hygienist at entry.) Another metric of interest, but beyond the scope of the project, would be an evaluation of the field of environmental health practitioners in the State of Oklahoma who hold degrees from the program who are still engaged and working in the field at two, five, and ten years plus graduation from the program, and the comparative rates of the advancement among these professionals and those who hold other degrees or credentials that qualified them for the equivalent initial entry positions at about the same time as the public health graduates.

The College of Public Health does not maintain employment statistics on its graduates, thus it is difficult to determine the number of individuals holding positions with environmental health responsibility who are products of the program. It was well beyond the scope of this project to conduct individual interviews or surveys which would have been necessary to answer the questions of what fraction of the graduates are entering environmental health workforce at the agency level/ and which agency they are joining.

5. Washington: The areas the University of Washington environmental health program most thoroughly covered was occupational health and safety, followed by air quality, hazardous waste, and injuries. Housing and vector were given the least amount of time within the courses surveyed. Occupational health seemed to be a focus of the department and yet is only requested by 15% of the agency respondents. However when the data was segregated into agency specific preference, the Department of Labor and Industries (L&I) places a high value on a strong occupational health background because they requested that knowledge area in every position description reviewed. A substantial portion of student interns were placed at L&I this year, possibly reflecting the influence of the strong partnership between L&I and the Department.

UW Environmental Health faculty devote much of their efforts to teaching technical (i.e., engineering and quantitative) skills. However it is important to note that these two skills areas are either assumed or not seen to be as important as other skills because they were least cited as "required". Perhaps an even more puzzling finding is the amount of time devoted to interpretive, creativity, and problem solving abilities. The faculty openly discussed with the project staff that they did not have sufficient time to devote to such skills and yet they report that a major portion of the curricula is devoted to teaching such attributes. This may be an issue of differing definitions and may be an excellent springboard for continued discussion among faculty and agency employers.

Internship and Field Training Placement

Every School requires their MPH students to complete an internship or student practicum. In most of the Schools of Public Health surveyed other students (MS and Ph.D. students) are either required or encouraged to complete an internship as well.

1. Hawaii: When the project began, the School of Public Health had a field training coordinator. Due to loss of funding the position was eliminated during the project's second year (1995-1996). The field training coordinator worked with the Department of Health/ local hospitals/ other health care agencies, and some private businesses trying to determine the needs of the these agencies and businesses and then make these internship opportunities known to their students. Despite this, a formalized procedure where agencies automatically contact the School of Public Health to register their internship opportunities was not established. It was, and remains, the responsibility of the student to propose a worthy project, and to select and/or arrange the site and a mentor. It is commonplace for these assignments to be unpaid positions usually completed during the summer months of May through August.

During the project's third year (1996-1997) project staff contacted all the environmentally related programs at the DOH to ascertain the number of possible internship opportunities available for the approaching summer. With the exception of internship positions with the Epidemiology branch of the DOH/ as temporary emergency hires/ there were no paid positions available. In fact, even available unpaid internship positions were scarce. Only 5 programs (Environmental Planning, Safe Drinking Water Branch, Office of Solid Waste, Noise & Radiation Branch, and the Civil Defense Agency of Oahu) were willing to work with an intern/ although none of these had a definite position actually available. Among the reasons cited for not wanting or needing an intern were the lack of staff and the

time required to work with an intern. Because of recent cut-backs and hiring freezes/ many of the State's programs are at bare bones staffing levels. The existing staff is already working to capacity and simply does not have the time to devote to a temporary trainee.

During the period September 1994 through August 1997, 75 field training practica were performed by the environmental/occupational health MPH non-thesis students - an average of 25 per year. Prior to the study, from Spring 1985 semester through fall 1994 semester, a total of 134 field training assignments were conducted, an average of 15 per year. As favorable as this appears the increase in the average number of internships completed is more a factor of the number of students than of any project related activities since internships are a requirement for graduation among non-thesis students.

2. Alaska: Hawaii project staff found the situation was somewhat different in the State of Alaska. State internship positions in Alaska are all paid positions. However, State of Alaska policy prohibits the hiring of non-Alaska residents for internships. Possible interns contact the Alaska state program with which they are interested in working. Interns are hired if funding is available and if a match is established between the trainee and program. During the project's duration, no field training was done in Alaska by School of Public Health students.

3. Florida: No data were available regarding the University of South Florida's student interns/ but a few students were in the process of instigating an internship. Although all MPH (non-thesis) students are required to undertake at least one field experience during their academic year, internships are often waived because most of the student population at the College of Public Health are already working in the field. Many are older students who have had years of experience in the workforce and are attending school part time to obtain a Masters degree or Ph.D. The department of Environmental and Occupational Health had 128 students enrolled for the Spring of 1997. Sixty percent were part time (less then nine credit hours) and 39.8% students were full time.

4. New York: Master of Public Health (MPH) and MS students have access through the School of Public Health to an array of internship and file placement opportunities. The unique partnership between the School of Public Health and the New York Department of Health and Albany Medical College facilitates these activities. A wide variety of other training agencies are available, public and private health institutions throughout New York state; the Centers for Disease Control and Prevention (CDC); the National Institute of Occupational Safety and Health (NIOSH), Commissioned Officer Training and Extern Program (COSTEP).

Every MPH student in the School of Public Health must complete twelve semester credits of internship. Three of these internships credits have to be outside of the student's chosen area of concentration. This gives breadth to the internship experience which completes the MPH degree requirement. Twenty-four 24 internships have been completed by students who have selected the concentration in Environmental Health, 16 Environmental Health internships have been selected by students who are in other concentrations; and 17 Environmental Health internships exist with agencies that have not yet been used by School of Public Health students. Many of the training agencies are used repeatedly by each new class of MPH students. For example, various agencies in DOH have been used for 23 of the completed Environmental Health internships.

MPH students with previous non-clinical public health experience can apply for a waiver for up to six semester credits of the internship requirement. This means they then have to complete six credits of internship.

Each student internship is a unique experience and the actual content varies widely. Many internships involve ongoing work or research in the training agency. The intent of the internship is that it is not just academic exercises, but work/research that the agency needs done. The student intern provides a valuable service for the training agency because they complete work that otherwise may not be done.

5. Oklahoma: For the Master of Public Health students, an internship or field placement is required part of the degree program unless the student is already working in the field and can substantiate adequate work experience. The sites for the internship and practice were identified by a variety of methods including: contacts with public agencies; contacts within federal agencies located in the state and region, established linkages in private sector (this is especially important for the occupational health contingent); new contacts made through working students pursuing degrees; and, new linkages and contacts that were made through existing networks of referrals.

The existing network of contacts, and the fact that the Department has a strong orientation to the practice arena has resulted in an internship process that has never failed to place a student in the 30 years the College of Public Health has been in existence. Consequently, there was not a discernible "new plateau" or level of increased success that could be readily identified as necessary to meet current or future predictable needs of the program. This is due to the fact that Oklahoma's program is in a smaller market than many of the sibling programs, and is well established within its market region. New opportunities for practice sites are always welcome, explored and developed; however it is also recognized as equally important to sustain the existing networks and fill internships with quality students well matched to the needs of the sites to which they are assigned.

In terms of statistics, 46 students completed internships during the course of the project, which is line with the average of 15 students per year requiring an internship. Of the average of 15 students per year, approximately one half will complete their internships in the private sector and the public sector either with an agency at the state or federal level.

The University of Oklahoma has organized a task force of students to investigate potential internship and field placement sites within the state. They have several students within the program who have contacts they hope to utilize.

6. Washington: The University of Washington's environmental health students are not required to complete an internship, except for those in the MPH program. Since the Environmental Health MPH is reserved for physicians and others with an earned doctoral degree, most students are exempt from the requirement. Despite this, there is considerable interest, on the part of both the students and many of the faculty, in having students complete an internship. There are ample opportunities to participate in internships. "We have more internships than we can fill" concluded the Director of the Field Research and Consultation Group, who coordinates most of the internships. However, hesitation to participate in internships still exists on the part of many students. Informal interviews indicate that many graduate

students find the time commitment too taxing. Further, some of the research faculty are not supportive of student internships as they believe the student should be concentrating on their academic preparation, especially that in the laboratory setting. Also contributing to the problem is the fact that students often rely on research positions for educational funding. These additional challenges need to be addressed.

In 1996, nine students completed internships. Of these nine only 3 did so at a state agency. "For the most part students lean towards private industry because they view it as an opportunity to get their foot in the door for a profitable job after graduation". Historically students have been placed with Boeing, Weyerhaeuser, and several state and local health agencies. In 1997, however, while seeing a decrease in internship participation, there was a marked increase in public sector internships, with 80% of the internships being in public agencies, namely Department of Labor and Industries, King County Department of Metropolitan Services (Metro), and the City of Tacoma.

"These are formidable obstacles" commented one former student during the presentation to the Environmental Health faculty "*but my experience at Department of Labor and Industries showed me the reality of being an environmental health practitioner. Sure I had to know the toxicology but mostly I was challenged by the fact that I had to explain it all to pregnant women who were very distressed about potential harms, but yet did not understand any toxicology. Explaining our risk assessment to them in a manner that was comprehensible was a task for which no class prepared me."*

Agency Faculty Linkages

One of the purposes of this project was to increase the communications and linkages between environmental health faculty in the Schools of Public Health and the public sector employers of environmental health graduates. To accurately assess this objective would require a baseline rate of communications and linkages at the project's beginning followed by a consistent monitoring program of communications and linkages between the faculty and the agencies. This type of formal assessment arrangement was not feasible. Even if such a monitoring program had been instituted it would have been difficult at best to maintain the necessary level of cooperation from the faculty over a three-year period. While not a difficult task, manually recording each and every communication with agencies that might employ our Students was seen as a nuisance and an imposition by the faculty. Nonetheless links with agencies employing our students have increased. Project staff had numerous communications with these agencies throughout the life of the project specifically on job descriptions, students' skills/ employment opportunities, and internship opportunities. These interchanges would not have occurred if not for the project. Each of these communications were conducted with the intention of furthering increased understanding and awareness between the Schools of Public Health and the employing agencies.

1. **Florida:** The project staff met with 67 County Environmental Health Administrators directed by the State of Florida Department of Health. Fifty-nine administrators completed a survey on the

order of importance if desired skills and knowledge in hiring new environmental personnel. The results of this survey showed that the administrators felt that problem solving, planning, organization skill/ quantitative evaluations, and creativity were the top five of the desired skills. The survey also showed that the top five desired knowledge areas are communication, inspection and investigation, regulations, sampling methods, and planning.

2. Hawaii: The University of Hawaii at Manoa School of Public Health has had a favorable history of linkages with public agencies and private industries. Leaders from local agencies are frequently called upon to serve as guest lecturers for courses and seminars as well as to precept internships. Likewise public agencies and private businesses will call upon the faculty of the School of Public Health with pressing needs. When confronted with environmental or occupational health concerns which are beyond their expertise the agencies often call the faculty at the University of Hawaii for their views on the latest theories technologies or methodologies. Efforts to increase this reciprocity continue as a part of this study and beyond.

3. New York: New York enjoys a unique position in that its is institutionally linked to the Department of Health. Most faculty are also employed by the Department of Health as practitioners, thus me school itself is a permanent link. New York Project staff focused on enlisting the participation of agencies that hire environmental health graduates but are not linked directly to the school, like for example the Department of Agriculture. New York has utilized this study to open lines of communication with non-traditional environmental health employers.

4. Oklahoma: The College of Public Health actively seeks to establish new and innovative links with public agencies and private sector organizations for the purposes of enhancing internship and practica sites for students, potential employment opportunities for graduates, and for developing research and contracting efforts. As federal funding becomes more competitive and difficult to obtain, the private sector has become an increasingly important source to support research efforts in many programs, Oklahoma University Health Science Center program included. Additionally, due to the differences in pay scales found in public versus private sector, most students are targeting the private sector first to pursue their careers. The existing linkages and partnerships between the Department of Occupational and Environmental Health and the public and private sectors will remain solid and robust only so long as the Department is capable of meeting the needs of these employers; only as long as graduates are provided with the range of necessary Knowledge, Skills, and Abilities (KSAs) to make them initially competitive for the various positions available, and capable of maintaining their competitive edge in an increasingly competitive and “rightsizing” workforce. Historical linkages with the Department of Health and Department of Environmental Quality will no doubt remain in tact and continue strong and dependable for all partners. However, new partnerships with the US Department of Defense, Department if Energy, mining industry, national laboratories, and a variety of private sector entities are equally important and receive substantial attention to solidify and enhance.

5. Washington: The University of Washington attempted to bridge the communications gap between faculty of environmental health and the agencies that employ their graduates, through several activities. First, project staff presented their preliminary findings to the faculty, then the findings were submitted to the agency contacts who provided the job descriptions to the project. Again, these agen-

cies were surveyed regarding their impression of our findings. Once both agency and faculty members were briefed on our findings, an “Environmental Health Career Day” was held to help open lines of communications and foster further linkages. This has now become an annual event.

VI. PROJECT EVALUATION

Overall the project achieved almost all of the objectives set forth in the project plan, although not all of the project activities turned out to be amenable to quantitative measures.

Objective 1. Identification of Environmental Health Positions:

The extent to which the project was successful in identifying and securing position descriptions for job openings for which graduates of environmental health programs in Schools of Public Health are qualified and/or sought was evaluated by (1) comparing the compiled data on agencies/ job titles and degrees with several available national environmental careers publications, and (2) a validation process involving soliciting additional input from various practitioner groups in each state.

At the beginning of the project the staff completed a comprehensive literature review to gain an overview of the continuously changing field of environmental and occupational public health in hopes of uncovering emerging areas that might be suitable employment opportunities for graduates of environmental and occupational health programs. Together with the existing knowledge of the agency staff on environmental and occupational health positions and employers the project staff felt confident that the topic was sufficiently exhausted.

The next step was the identification of all environmental health positions within state agencies. The accomplishment of this objective involved not only identifying each state agency, but also making contact with them/ identifying the appropriate personnel offices for each state or local agency, and obtaining the published job description for each of the job positions requiring the knowledge/ skills and abilities typically involved with the practice of environmental health.

Project staff developed a data extraction instrument to help assure that the data on the requisite academic degrees/ professional licenses or certifications/ and the essential knowledge/ skills/ and abilities (KSAs) which were required for each job position would be recorded in a uniform manner among each of five project teams. Staff then used the CDC developed software program *EpiInfo* to record project information.

All of this resulted in a greater understanding of the definition of environmental health as viewed by agencies/ the degree to which the KSAs are prioritized in recruitment; the identification of, and understanding of, the apparent degree of disconnection between the Environmental Health curricula in Schools of Public Health schools and duties and responsibilities of the “real world” jobs.

Since the project’s staff did not personally review the entire collection of position descriptions, due to geographic limitations, the comprehensiveness of positions included is difficult to assess. The projects often relied on the knowledge and expertise of the human resource specialists to determine the relevance of a position to the project. It is possible that a position or less likely a position series might

have been overlooked and not included in the study. However, by contacting each agency, rather than relying solely on the state personnel department, it was possible to cross check the composite database. This increased the confidence that all major job positions had been identified in each state.

There were few changes in project staff over the course of the project. Therefore, the problems associated with discrepancies in interpretation due to multiple personnel evaluating the similar criteria (class specifications) was not an issue for the University of Hawaii at Manoa School of Public Health portion of the project (with the exception of outside determination of criteria fit in Alaska). Similarly while there were some staff changes within other schools the same individual reviewed the job descriptions for inclusion in the study.

Once recorded, this information became useful beyond the original scope of the project. For instance, Florida reviewed, classified, and arranged in a matrix all of the state's environmental jobs. This computer matrix has been made accessible to students, becoming a part of the students' counseling and advisory database. In Oklahoma a research assistant now holds a state position where she utilizes the database to improve the delivery of environmental health services in that state. Hawaii project staff have used the information from their portion of the database to illustrate the need for Environmental Health professionals for the University of Hawaii School of Public Health's National Institute of Occupational Safety and Health Training grant renewal application.

Project Staff at Washington also compared me lists to several national environmental publications like "Environmental Opportunities". It was found that in me area of environmental health, the project list contained more entries than those positions that were listed in most of me environmental career listings. This could be because many of the jobs looked at are not vacant at the time of the publication of the national publications. In addition many state agencies do not publicize their openings outside of the civil service announcements.

While the comparison of tile job list to national environmental jobs publications was positive, state agencies were again contacted to confirm that an accurate picture of their job descriptions had been created. This past spring the preliminary findings were disseminated to the agency contacts, who originally facilitated the collection of job descriptions. They were asked if the results portrayed an accurate picture of what they requested in their job descriptions and 100% of them responded affirmatively.

Objective 2. Field Practicum Sites:

Project staff at each university developed baseline information on the number of environmental health students from their school which typically participate in internships and/or field practica. The project attempted to track the number of available positions and completed field placements which took place over the project's lifetime. It was anticipated that outside factors such as the economy, media attention and government resources, as well as project efforts, would influence the availability of, and placement of students in, field sites. This indeed was the case.

The University of Hawaii at Manoa School of Public Health is fortunate to have the services of

the Student Services Office. Among the varied services they provide they maintain accurate records of the number of students, the types of degrees they are seeking, and the number of students fulfilling their internship requirements. From their meticulous records the project feels confident in our tracking the progression of internship activities.

A discouraging trend is the lack of paid positions, mainly as the result of tightening budgets. Also related to lack of funds within me environmental programs of the Hawaii Department of Health is the scarcity of programs willing to work with interns. A frequently cited reason for this is the amount of time that is required to work with an intern. Because of the reduced budgets programs can not spare their employee's time to act as a mentor to a student.

There was a 19% increase in internship participation at University of Washington's Department of Environmental Health in 1996, followed by a slight decrease in 1997. Significant resistance to internships still exists due to time constraints, however more and more students are realizing the value of practical experience.

<u>Objective 3.</u> Employment Opportunities:

The success of the project in increasing the awareness of employing agencies of the benefits of hiring personnel with formal environmental health education was to be evaluated by tracking changes in job announcements of the various agencies included in the study over me duration of me project. However, due to the process involved with changing job descriptions it was not possible to quantify any measurable change during the time period of the project. However, there is anecdotal evidence that the project did make a difference.

The State of Hawaii, Department of Health, Environmental Health Division is currently preparing to review and update all environmental and occupational health job descriptions. As a part of their process, they have sought the results from our project for inclusions in their review.

While it is difficult to measure attitudinal changes regarding acceptance of environmental health as the preferred field for the positions reviewed, Washington project staff are confident that they have increased awareness of the inclusion of environmental health as a viable (if not preferred) background for the positions reviewed. Personnel managers at the Department of Transportation, for example, were surprised when they actually were able to submit job descriptions to us which had a large environmental health component. While this may not signify that they will alter their job descriptions to include or prefer environmental health education, they may take a closer look at an applicant with that background rather than discarding his/her application as an inappropriate background. This effect has also spilled over into the private sector. During the Environmental Health Career Day, Keith C. Warner, Manager of Water Resource Management and Energy and Environmental Affairs for Boeing, commented *"Since I have an engineering background I always look for engineers, but it seems like environmental health programs have many of the KSAs I need in my employees"*.

<u>Objective 4.</u> Academic/Practice Linkages:

The project also envisioned tracking changes in the number of contacts between agency employers and school faculty, recruiting visits.

Linkages between agency and faculty have increased at the University of Washington. While no formal tracking of all the increased communications between academia and practitioners was practical, the Environmental Health Career Day, as one example, was catalyst for communication between the two groups. The event was largely requested by students and was cosponsored by the graduate program staff and by this grant. At this event the faculty heard from the practitioners exactly what they are looking for in their employees. The faculty are concerned about the marketability of their students and thus were greatly interested in what the speakers had to say. It is interesting that when the project staff presented the same message to the faculty, it was met with a fair amount of skepticism and resistance. But when communicated by actual employers, the reaction was much more positive. In part this may be because there can be no argument with the employers as they are the ones doing the hiring. (This is different from the project staff presenting data to a group of faculty who are used to looking at, and questioning, study designs, data, and the interpretation of results.) But in part, this was also a function of consciousness raising, as a result of the efforts of both this project staff and of the students in the program.

<u>Objective 5.</u> Environmental Health Curricula:

It was anticipated that this would be the most difficult aspect of the project to evaluate for at least two reasons. First, there was only a relatively short time period between the point when the initial data was collected and shared with the faculty in the various schools and the end of the project. Major changes in curricula tend to take a long time. Such changes are difficult to measure qualitatively and quantitatively over a short period such as our project's. And second, there may be small changes, as individual faculty make adjustments in their existing courses. However, it is difficult to gather quantitative information on these changes. The approach which was believed to hold the most promise was holding a series of discussion of the findings of the project by the collective environmental health faculty at each school.

The environmental and occupational faculty at Hawaii are concerned with providing quality courses that have relevance to real world situations. This is evident in their current review of their course curricula and their willingness to participate in activities designed to improve the curricula of the environmental/occupational program.

For complete evaluation of our success in this area would require a re-evaluation in 1 to 2 years to assess the extent to which changes were made in the curricula.

When Washington staff presented their preliminary findings to the Environmental Health faculty there were some very strong reactions to the implications of our findings (i.e. curricula change was evidently needed). Similarly the curricula review questionnaires received did not indicate they were willing to consider curricula change. Only one respondent responded affirmatively to considering curricula change. Several faculty members also raised a poignant question - "Whose responsibility is it

to teach communication skills?" While most conceded they should be taught throughout all age curricula, they stated it often is not, which then creates an additional burden of teaching remedial skills to those who did not grow enough in their communications abilities.

However the Curricula Review Questionnaire did indicate that the professors surveyed felt that they are already spending much time on those skills we highlighted (namely problem solving, interpretive skills and management ability. Again this could merely be a case of definitional differences or it may serve as an attitudinal mark because the Curricula Review Questionnaire was disseminated shortly after the Environmental Health Career Day. In addition there are several other dynamics that can be examined when change is at hand. If a world renowned toxicologist states that he has no time to add communication skills to his curricula, he may indeed be correct, however it is often that underlying concerns are at the root of the resistance. He/she may feel confident in being the best the toxicology field has to offer and yet not feel confident perhaps in their own communication skills, much less having the ability to teach them to others.

By contrast Florida's curricula changes are currently geared towards including more laboratory experience in the curricula.

VII. DISCUSSION

This project suggests that there is a lack a/understanding on the part of the academic community of the needs of employing agencies, and an equal lack of understanding on the part of many potential employers of the knowledge skills and abilities which graduates of Environmental Health programs possess. The situation is the result of two trends. The first is that increasingly large proportions of Environmental Health/acuity in the Schools of Public Health are products of discipline-specific education programs such as microbiology, chemistry, toxicology, engineering, and medicine. Second is the well documented fragmentation which has occurred over the last 30 years in the field of environmental science and protection. It is also evident from looking at the job announce-ments from several state environmental protection agencies that most of these agencies do not know, or understand the capabilities of the broadly educated environmental health practitioner.

When the comprehensive database was analyzed, individual state trends lost resolution. For example Florida's focus on sampling and laboratory skills differ greatly from Washington's focus on organizational abilities. This finding is significant because in some states KSAs cross agency lines it seems as though those same KSAs do not apply to state boundaries. It is possible that different states define a qualified environmental health practitioner differently and thus a professional who might excel in Washington's system may not excel in Florida's. However it is important to note what KSAs were consistent. Communication and interpretive skills were highly desired in every state. Conclusively we can say that these skills are crucial to environmental health practice.

The issue of outdated job descriptions was expected, nevertheless, it was important to document the current status and highlight this as an issue which needs to be addressed. Hawaii found many instances where graduate level education and degrees in environmental and occupational public health were not recognized as a valued characteristic. Washington also found that many of the class specifications reviewed were out-dated. If the project accomplished nothing more than highlighting these situations, its contribution to the field would still have been significant. An important follow-up step is the distribution of the final report to the human resource offices and to other interested parties. The human resource offices are well aware of the dated nature of the class specifications, but they might not be as aware of the suitability of environmental and occupational health students for a variety of positions within their purview. Even with this information change may not be immediate as state agencies tend to be bound by criteria and procedures specified in statutes or operating policies which are not rapidly changed. Out of the 212 job descriptions included in the study only 7 (3%) required a Master in Public Health degree.

The 1995 Health Resources & Services Administration's profile of US environmental health and protection services. *Who's in Charge?,* reported a sizable discrepancy between the budgets of Alaska and Hawaii. Using figures from 1992-94 it was found that the average per capita amount spent on environmental regulation programs in Alaska was $20.01. For environmental health programs Alaska spent on average $19.89 per capita. Hawaii, however, spent an average of $7.75 and $8.16 per capita for environmental regulations programs and environmental health programs respectively. Although the HRSA report places both of these states in the same quartile category (the highest quartile) for the average per capita expenditures for environmental health programs the range for this quartile is quite large ($5.64-38.47). If nothing else, the incongruity in available funds weighs heavily on the extent to

which a program can carry out its mission. For our purposes this fact may be affecting the ability of an agency to update position descriptions. If the Alaskan Department of Human Resources also has a significantly larger budget than Hawaii they may be better equipped/staffed to regularly update job descriptions.

Also notable is the difference in the degrees requested or required by the employing agency. Several Alaska positions recognize the importance of graduate degrees in public health, environmental health, environmental science, industrial hygiene, epidemiology, engineering, and toxicology. This is not the case in Hawaii. Graduate degrees for positions in Hawaii are only desired for some of the positions in the engineering field. The caveat here is that in Hawaii the job market is tight and there is not a high turnover rate. While a position may only require a bachelor's degree the competitive job market makes those with advanced degrees more desirable. The lack of formal requirements for graduate degrees may be a reflection of the age of Hawaii's job class specifications.

The efforts of the Oklahoma's team did raise the level of awareness at the Office of Personnel Management regarding the package of the KSAs that a graduate from the Department of Occupational and Environmental Health affords an agency. From mat perspective, the Office of Personnel Management may act to counsel agencies in the future that a public health, environmental KSA package may be equally appropriate or preferred for a particular agency position, and act to bring that fact to the attention of the sponsoring agency. Unfortunately, there is no way to track this opportunity or to encourage Office of Personnel Management to do so.

Many position descriptions originally designed in the 1940's and 1950's still exist in some agencies, and although updated over the years, still reflect the requirement for an engineering, animal husbandry, geology, or other degree if not inappropriate for the position as it exists in the 1990's, is certainly no more appropriate than an environmental health degree from a public health program.

The Office of Personnel Management and the agencies may not differentiate between "environmental engineering", "environmental health", and "environmental science". If the position requires the successful candidate to hold a certification as a professional engineer, then there will generally be some specificity as to the type of engineering required, but beyond that level, there is little or no distinction for positions incorporating "environmental" in the job title.

VIII. CONCLUSIONS AND RECOMMENDATIONS

Job Descriptions

An obvious first recommendation would be for the programs and departments that hire or potentially could hire environmental and occupational health graduates, to make every effort to budget the time and personnel needed to initiate a complete review of all class specifications/job descriptions. When this task is completed the human resource specialists will be able to better screen applicants and then forward qualified applications to the departments for interviewing. The result will be candidates that are better suited to meet the present-day demands of the job. Realistically, due to tight budgets in both Alaska and Hawaii this is a monumental task. However, the project is encouraged to know that the Environmental Health Division in the State of Hawaii is taking steps to review all of their class specifications. In addition cooperation between several states' human resource specialists could also facilitate discussion, analysis, and updated definition and consideration of what an environmental health practitioner should know.

An Academic Advisory Committee

Academic advisory committees or review panels for personnel departments could assist agencies in facilitating efficient hiring practices and communicating their curricula needs. The University of Washington currently has private sector advisory committees in academia. These could be volunteer positions and need not cost the agency large dollars.

Faculty/Agency Links

This project has served in informing both faculty and agency participants of the possibility and applicability of utilizing each other's resources. We believe this grant will increase the amount of guest industry lecturers that will help agencies understand the difficulties inherent to teaching complex technical policy issues. The increased faculty participation through service projects or consulting will help faculty become intimate with the practical issues of environmental health and will also illustrate the importance of communication skills in environmental health.

Additional Research

Additional funds to facilitate faculty agency conferences; internships; and to create and maintain a permanent infrastructure for communication between universities and state environmental health agencies would be very beneficial. The advantage of this type of effort is that it can be easily translated into economically beneficial results directly within the constituency. For example the benefits of increased communications in the department of Labor and Industries can result in safer practices; less injuries; less time lost and thus a quantifiable benefit to that community. Also if universities are instructing areas that are pertinent to agency issues, state agencies will need to spend less time money and effort on retraining college graduates to fit their needs, thus tending to the environmental health needs of the community faster and better. This expediency would create a more economically efficient and socially salutary system to address environmental

health needs.

This project has again documented, that there is a gap between the existing environmental health curricula in Schools of Public Health and the wants and needs of the employers of the graduates of these institutions. While the project was limited to six states, there is no reason to believe there would be systematic differences in other states containing Schools of Public Health or in other governmental employers regardless of the state or level of government. However, should there be a need to document the situation in other states, or with the private sector, the methodology utilized in this study should provide a firm basis for collecting additional documentation.

Perhaps more importantly, this project has made significant progress in bridging the gap by engaging practitioners, faculty and personnel department staff in a dialogue. As a result of this project, personnel agencies are beginning to look at their job descriptions, faculty in the project schools have become more open to looking at the need to include important non-technical content in their courses, and agency program staff have a better understanding of their academic colleagues. To this extent the project has been an unqualified success. The challenge will be to maintain the dialogue in the absence of project funds.

IX. BIBLIOGRAPHY

Harding AK, Greer ML. The health impact of hazardous waste sites on minority communities: implications for public health and environmental health professionals, *Journal of Env. Health*, May 1993, 55(7):6-10.

Goldstein BD, EPA as a public health agency. *Regul. Toxicol. Pharmacol.*, Sep 1993, 8(3):328-334.

Rose VE, Manning JF. *Environmental Health Faculty/Employer Forum Final Report*, D.H.H.S., C.D.C., Health Resources and Services Administration, Washington DC, January 1989.

Stoto MA, Behrens R, Rosemont C. *Healthy People 2000: Citizens Chart the Course*, Institute of Medicine, National Academy Press, Washington DC 1990.

Public Health Improvement Plan: A Progress Report, Washington State Department of Health, Olympia WA, March 1994.

Promoting Health/Preventing Disease: Year 2000 Objectives for the Nation, D.H.H.S., U.S. Public Health Service, Washington DC, September 1989.

The Public Health Faculty/Agency Forum Final Report, D.H.H.S., C.D.C., Health Resources and Services Administration, Washington DC, April 18, 1991.

The Sanitarian in Environmental Health: Responsibilities and Competencies, National Environmental Health Association, Denver CO, 1980.