# Job Competency Needs of

# SANITARIAN AIDES

Developed by Community Services Division,
Iowa Western Community College, Council Bluffs,
in cooperation with
The Iowa Department of Public Instruction

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# PREFACE

Job Competency Needs of Sanitarian Aides was a research study undertaken to provide base data of benefit to persons developing curricula for sanitarian aide training programs. Employers and sanitarian aides also will be provided data upon which to develop job responsibilities and duties.

Limited copies of this publication are available without charge from the State Director, Career Education Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

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Research Assistant Alan Wagner has been a great help and inspiration. His help has been invaluable and is deeply appreciated.

Lastly, I must acknowledge the efforts of my wife, Everall, for her assistance in tabulating and in typing the rough drafts and for her patience in the lost evenings and weekends which I invested in this work rather than in our home and family.

H. C. Pengra
Principal Investigator

TABLE OF CONTENTS

TABLE OF TABLES

# CHAPTER I

# PRESENTATION OF THE PROBLEM

## Introduction

A study of the history of public health and environmental work in the United States reveals the fact that a position entitled Sanitarian Aide has emerged primarily within the past decade. Prior to the 1960's almost no reference is made in the technical journals relative to this position. In the professional writings of the later 1960's, however, frequent reference is made to a position variously entitled as Sanitary Assistant, Environmentalist I, Deputy Inspector, and Sanitary Officer to name a few.

Since the position, Sanitarian Aide, is relatively new in this country it is not surprising that the job descriptions and duties vary widely among employers and supervisors. Because of the wide diversity of the descriptions of this position, the comprehensive job description found in the Dictionary of Occupational Titles was used to form the basis for this study.

The job description found in the Dictionary of Occupational Titles is as follows:

> SANITARY INSPECTOR (gov. ser.) 168.287
> sanitarian aid. Investigates public and private establishments, such as restaurants, hotels, homes, cafeterias and places of public gatherings, to determine compliance with or violation of public sanitation laws and regulations; makes unannounced visits to various institutions to insure regulations are being followed. Inspects eating and drinking establishments for cleanliness, and determines if vermine or other pests, such as rats or mice, are present. Takes samples of such materials as water, food, and air and performs or orders chemical, physical or biological tests to determine contamination.

> Issues violation notices and corrective orders when violations are found. Assists SANITARIAN (profess and kin) in conducting phases of environmental health programs.[1]

This, then, is the job description of the sanitarian aide used in this study. While many other titles could have been used, the writer felt these other titles usually indicated a too narrow degree of specialization. The title, Sanitarian Aide, utilized in this paper indicates a position which requires the aide to have some knowledge and ability in those areas of environmental and public health work in which a professional sanitarian is required to have expertise. While the professional sanitarian invests at least four years in formal educational preparation, the aide or para-professional, with less than a baccalaureate degree, is usually employed at an entry level position.

## Statement of the Study

At the present time there appears to be widespread diversity concerning the duties and responsibilities for the position of sanitarian aide. Since there apparently exists almost no research relative to the duties and responsibilities of the sanitarian aide, curriculum writers have little evidence other than their own experience upon which to base their curriculum decisions. With a base of research data, more effective learning experiences can be developed for the training of sanitarian aides by curriculum designers. The lack of research has also created difficulty for both employers and sanitarian aides relative to the responsibilities and duties of this position. The lack of precision in the job description and duties of the sanitarian aide has contributed to either the under or over-utilization of the worker employed in this position.

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[1] U.S., Department of Labor, Dictionary of Occupational Titles, Third Edition (Washington: Government Printing Office, 1965), I, p. 626.

The purpose of the study is to identify job competency needs of Sanitarian Aides in the field of environmental sanitation and to assemble the data acquired in matrix form that educators may use for curriculum development.

This study provides curriculum writers with additional criteria upon which to base effective education and training programs for sanitarian aides. Employers and sanitarian aides will also be provided with basic data upon which to develop job responsibilities.

## Definition of Terms

Sanitarian Aide: A person with a high school or equivalent education trained in environmental control techniques to work as a para-professional under the supervision of a professional sanitarian.

Professional Sanitarian: A person with a minimum of a Bachelor's Degree in natural sciences and registered with the National Association of Environmental Sanitarians and/or another equal certifying agency in the field of environmental control.

## Limitations of the Study

The survey population of this study is limited to those persons in supervisory control of the position, Sanitarian Aide, in the states of Iowa and Nebraska. The determination was made that the size of the population to be surveyed in these two states would be sufficient to give adequate data.

The survey is limited to local and county boards of health and their environmental sanitation supervisory personnel. The respondent for the local and county boards of health in each case was the chairman or vice-chairman. An inquiry of the Nebraska State Health Department indicated there was no counterpart of these boards in Nebraska. Therefore, the survey population was limited to only the environmental sanitation supervisory personnel in the State of Nebraska.

The method used to gather the necessary data presented another limitation. Because of the limits of time, financial resources, and physical endurance, the writer found it necessary to gather the required data through the use of a mailed questionnaire.

## CHAPTER II

## SURVEY OF LITERATURE

The survey of literature has covered the publications of the health and environment-oriented organizations of the United States of America. The technical journals and publications of the organizations referred to above were located in the public libraries of Council Bluffs, Iowa; Omaha, Nebraska; and the college libraries of Iowa Western Community College and the University of Nebraska at Omaha. No references were located which met the criteria set forth in the definition in Chapter I.

The American Journal of Public Health reports on the utilization of health aides.[1] The health aides referred to in this article are unemployed, untrained persons who could be utilized to some extent in official health agency settings. The article designs a "conceptual framework" in which the health aide might be effectively utilized. An earlier issue of the same publication refers to new health careers.[2] This article proposes to utilize otherwise unemployed and/or socially depressed people who need the social status of a career rather than an entry level job with no chance for personal satisfaction or improvement.

Several other articles were located which discussed similar concepts. However, nothing was located relevant to job competency needs of sanitarian aides.

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[1]Lawrence B. Callan, "A Conceptual Framework for Consideration in the Utilization of Health Aides", American Journal of Public Health, 61:5:979-987, 1971.

[2]Anthony Lenzer, "New Health Careers for the Poor", American Journal of Public Health, 60:1:45-50, 1970.

The National Association of Environmental Sanitarians furnished a proposed two-year preparatory curriculum.[3] This curriculum has in it an introduction which states in part:

> The conference was attended by twenty-one people from academic institutions with two-year or four-year programs in environmental health, from agencies that employ environmental health technicians and sanitarians, and by persons experienced or knowledgeable in training and curriculum development. This conference was held because of the manpower needs in the field of environmental health. There is an increasing utilization of and need for two-year trained environmental control, and by industry. The community colleges developing programs for training environmental technicians need curriculum guidelines. The prediction for future manpower needs, and programs to train people to meet these needs, make the development of curriculum guidelines even more critical. (See Appendix A).

Several branches of the Department of Health, Education, and Welfare were contacted and the writer has had extensive correspondence with several schools of public health. While this phase of the study has been extremely time-consuming, the resultant correspondence is quoted since it sheds light as to the present data available related to the position of sanitarian aide.

Dr. C. H. Lawrence, Ph.D., Associate Professor of the Department of Environmental Health, University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma informed us:

> Your letter of January 15, to the Dean of the College of Health has been forwarded to the Department of Environmental Health for action. Unfortunately, we know of no literature review on the subject of "Competency Needs of Sanitarian Aides". We do, however, suggest that you contact Dr. Robert V. Garner, Oklahoma Environmental Information and Media Center, East Central State College, Ada, Oklahoma 74820.

As suggested, correspondence with Dr. Robert Garner was initiated, and he states:

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[3]Two Year Curriculum Environmental Health Technician. A Conference Report, Atlanta, Georgia. National Environmental Health Association & U.S. Public Health Service, May 27, 1970.

> Our personnel in the School of Environmental Science has been interested in the program you mentioned also. However, in their search for this same information very little has been found. In most of what has been uncovered has been just personal conversations with employed Sanitarians. From their interviews it appears that the working interest of being employed determines the competency of any Aides that he might employ.

Dr. J. W. Mason, Acting Chairman of the Department of Environmental Health Sciences of Tulane University, School of Public Health and Tropical Medicine at New Orleans, Louisiana states:

> To my knowledge, the Florida System of community colleges offers a program in air and water pollution technology at the Brevard County Community College - which is (or was) operated with the help of the Department of Environmental Engineering at the University of Florida in Gainesville, Florida. Dr. Robert Sholtes was involved in the early phases and, I assume they considered "competency needs" in designing their curricula. Bob has since left the University, however, they should be able to provide you with a forwarding address.
>
> Tulane has not been engaged in the area, thus we have no first hand information to offer.

A letter to Dr. Robert Sholtes was apparently not forwarded to his present address. Therefore, follow-up was incomplete on this suggestion.

In response to continued inquiry of the School of Public Health of the University of Texas at Houston, Dean Reuel Stallones responded:

> In response to your request for literature on the competency needs of sanitarian aides, I am sorry but I do not know of anything. I am referring your letter to Dr. Hemphill on our staff for direct reply to you, and I also suggest that you ask the people at the University of California School of Public Health at Berkeley.

Dr. F. M. Hemphill, also of the University of Texas at Houston, emphasizes the lack of research on Sanitarian Aides in his letter, a part of which is quoted here.

> Dr. Reuel A. Stallones has requested that I respond to your inquiry about the "competency needs" of sanitarian aides. I know of no literature which makes reference

> to "sanitarian aides" per se. Enclosed is all the information I could find which is in some way associated with related occupations.

Professor Walter Jopke, Division of Environmental Health and Safety, University Health Service of the University of Minnesota, answered the writer's inquiry as follows:

> Your letter regarding the competency needs of sanitarian aides has been forwarded to me for reply. Since we do not, at the University, offer any particular curriculum relating to sanitarian aides, it was necessary for me to do a little inquiring with other colleges in this area.
>
> The first suggestion I would make is that you write to the National Environmental Health Association, 1600 Pennsylvania Street, Denver, Colorado 80203, and request a copy of their "Recommended Qualifications and Employment Standards for Environmental Health Personnel." This will give some background information and help you evaluate some of the environmental health needs for your study.
>
> Last week the faculty of the local Anoka County College and Hennepin Junior College met with us and representatives from industry to determine the interest for sanitarian aides or trainees. It is our feeling that, unless it's a large health agency whereby these aides can be used for sampling, nuisances and so forth, there appears to be no need for them. However, it was interesting to note the interests of industry, (represented by Northern States Power Company, General Mills, Honeywell, Pollution Curbs and the State Pollution Control Agency) apparently are different. Each industry had their own course requirements depending upon, for instance, a sampling program of air, water, waste, computer needs, etc., and it was difficult to put all of these courses into a two-year college level course. In any case, there is some interest from industry for this type of personnel.
>
> Some of the faculty of the above-named colleges will be proceeding with this program and we should have further information from them.
>
> Sorry that I do not have any more information. However, I hope that this information will be of some help.

Professor Cornelius W. Kruse of John Hopkins University, School of Hygiene and Public Health, states in part:

> Unfortunately we do not have any literature on this subject but suggest you contact Dr. R. W. Jones, Chief, Foreign Students

Education Branch, Bureau of Health Profession Education and Manpower Training, 330 C Street, S.W., Washington D.C. 20201. He made an Environmental Health Manpower Study with special emphasis on "competency needs" of all kinds of personnel.

Dr. Jones was contacted by both correspondence and telephone.[4] He was interested enough in this project to photocopy a large portion of his doctoral dissertation. This was thoroughly reviewed. This excellent work describes the educational background of the public health employees in the State of Maryland and it projects probable future needs in the same areas. Dr. Jones is one of the most noted authorities on public health training in this country and his work reveals the need for competency studies. He reports that in Maryland 20.6% of the sanitarians are without college degrees while 35.1% of the aides have completed one to four years of college work.

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[4]Robert W. Jones III, "Maryland Environmental Health Manpower Projection 1980" (unpublished Doctoral dissertation, John Hopkins University, 1969), pp. 92-97.

# CHAPTER III

## METHODS AND PROCEDURES

The purpose of this chapter is to present the methods and procedures employed in this study to amass, order, and analyze the data of the respondents selected to participate in the study.

### The Population of the Study

The total population selected to participate in phase one of the study was 245. The total population for phase two of the study was 250. The reason for the change in the survey population was due to the personnel changes in the various health departments included in the survey.

Table I displays the population numbers mailed and numbers returned. The population is divided into the five divisions used throughout the study.

TABLE I

NUMBER OF SURVEY INSTRUMENTS MAILED AND RETURNED
CATEGORIZED BY QUESTIONNAIRE AND SURVEY POPULATION SUBDIVISION

| POPULATION DIVISION | PHASE I | | PHASE II | | | |
|---|---|---|---|---|---|---|
| | QUESTIONNAIRE I | | QUESTIONNAIRE II | | QUESTIONNAIRE III | |
| | SENT | RETURNED | SENT | RETURNED | SENT | RETURNED |
| Iowa Board | 110 | 52 | 109 | 50 | 109 | 45 |
| Iowa Administrators | 25 | 11 | 24 | 15 | 24 | 15 |
| Iowa Sanitarians | 48 | 52 | 54 | 35 | 54 | 39 |
| Nebr. Administrators | 19 | 19 | 28 | 12 | 28 | 13 |
| Nebr. Sanitarians | 43 | 29 | 35 | 20 | 35 | 10 |
| TOTAL | 245 | 163 | 250 | 132 | 250 | 122 |
| % Returned | 66.53 | | 52.80 | | 48.80 | |
| Returned Unusable | | 22 | | 19 | | 17 |
| Grand Total Returned | | 185 | | 151 | | 139 |
| % Accounted for | 75.51 | | 60.40 | | 55.60 | |

All levels of government were represented in the survey population since the sanitarian aide would be an employee of a local, county, state, or Federal agency. The board of health chairmen were requested to complete the survey instrument to provide an opinion of major employers of what job competency needs are required.

The administrators and sanitarians within the survey population were requested to complete the questionnaire to provide their respective opinions relative to the job competency requirements of the sanitarian aide. This broad spectrum of opinions of supervisors, directors or administrators, and employers or board members provides a better foundation for the conclusions drawn in Chapter V than could be drawn from a narrow survey population.

The administrators and sanitarians of Nebraska and Iowa were surveyed to give a comparision of their opinions as to job requirements. Iowa does not have a professional sanitarian registration law. Nebraska has had such a law in effect for several years. Consequently all administrators and sanitarians surveyed in Nebraska are registered professional sanitarians while many in Iowa are not. It was deemed desirable to compare the competencies expected of the aides in Iowa and Nebraska since the potential supervisors in one state must meet registration standards which are not required in the other.

## Development of the Survey Instrument

Early in the study it became evident that the potential knowledges and abilities of the Sanitarian Aide were numerous and varied. A questionnaire which would thoroughly survey all the potential skills required of the sanitarian aide would be so cumbersome and unwieldly that response from the population would be discouraged rather than enhanced. It was decided to divide the research into smaller modules to encourage the respondents to

complete the survey instruments. The potential specialty work areas were grouped into five modules. The first questionnaire was based upon the first module. The second and third questionnaires were of the same format except that they were longer and covered two modules each.

The first survey instrument had 65 questions. The second survey instrument consisted of 124 questions and the third had 120. This totals 309 questions asked each of the respondents.

The respondent was provided three possible responses of varying degrees of importance to each question. These possible responses were: A, Very Necessary; B, Desirable; C, Not applicable. It should be noted this survey instrument was not designed to gather data on the frequency of use of these competencies but upon the necessity of having them. Some of the competencies listed in the questionnaire are used seldomly. For example, only twice in 20 years has the writer had to do the epidemiology of a possible rabies outbreak in humans. Knowledge of how to handle these potentially critical situations was invaluable.

The first ten questions were considered personal attributes of a sanitarian aide. The other 299 questions of the three questionnaires were taken from codes, ordinances, and regulations used in the work areas of the sanitarian aide. The 299 questions were divided into twenty subject areas in which the sanitarian aide might be expected to work. The subject areas were separated and displayed on the questionnaires. The first questionnaire contained 66 questions. The first ten mentioned above, the remaining 56 are on the subjects of private water supplies, private sewage systems, nuisance complaints, and eating and drinking establishments.

The second survey instrument contained 124 questions on the subjects of air pollution, solid waste control, industrial noise, water pollution control,

transient lodging facilities, communicable disease control, swimming pool inspection and milk inspection. The third and last survey instrument contained 120 questions on the subject of housing inspection, rodent control, occupational safety inspection, radiological inspection, industrial sanitation, insect control, animal control and institutional inspection.

The survey instruments were field tested. The field test was conducted by submitting the questionnaire to two board members, two administrators, and two sanitarians. Each item was checked for appropriateness of wording, clarity of item construction, and comprehensiveness of possible responses. Suggestions received from the field trial were incorporated into the final survey instrument. Copies of the final survey instruments appear in Appendix C.

## Collection of the Data

The questionnaires were printed on the inside of a double sheet of paper with a cover letter printed on the front. The name and address of each member of the survey population was typed onto the cover letter. This provided a positive identification of each respondent. A self-addressed stamped envelope was included and the packet of materials was mailed.

## Treatment of the Data

Each questionnaire, as it was received by the investigator, was sorted and placed in the proper sub-group category. The responses contained in each questionnaire were recorded on specially-constructed worksheets.

Accumulated totals and percentages of the responses were computed for each item of the questionnaire.

To enable the investigator to analyze the data, a numerical value was assigned to each of the three possible responses. Response A, Very necessary,

was assigned the numerical value 3; response B, Desirable, was assigned 2; and response C, Not Applicable, was assigned the value of 1. The Competency Needs Factor (CNF) was computed for each item of the questionnaire for each sub-group of the population surveyed. For example, on item #1, nine Iowa health department administrators indicated "A", two indicated "B", none indicated "C". This gave a weighted score of 31 from 11 respondents. The CNF for item #1 for this sub-group was computed at 2.82. The highest CNF possible in this study is 3.00 and the lowest CNF is 1.00. From the worksheets, the CNF was calculated for each of the 309 items for the five sub-populations of the survey.

# CHAPTER IV

# FINDINGS OF THE STUDY

This chapter will provide the reader with a display of the assembled data of the study. The assembled data are provided by total population, by the individual Iowa sub-groups, and by the individual Nebraska sub-groups. In addition, a table of comparison between the Iowa and Nebraska populations is provided for each item of the survey instrument.

The competency need factor of each item is listed in descending order in the left hand column in all but the final table. In these same tables the second and third columns provide the survey item number and item description respectively.

The tables include the entire responses. In the final table the items are listed in ascending numerical order in the first column to the left with the CNF in the second column and the description to the right. This final table was included because Nebraska has had a professional registration law for public health sanitarians in effect for several years. Iowa has no such law. The comparisons found in the displayed material in Table VIII should be of interest to many in Environmental and Public Health work.

The total survey population selected to participate in this study are the Boards of Health Chairmen of Iowa and the Health Department Administrators and practicing Sanitarians of Iowa and Nebraska. This divided the survey population into five sub-groups as indicated in Table I.

Since the subject to be researched is so extensive the determination was made to use three questionnaires. These were mailed several weeks apart to the total survey population. Due to the time span involved the survey population varied between 245 and 250 individuals. The percentage of returns predictably went down on each questionnaire mailing. For the first survey 75.51% were returned. On the second survey 60.40% were returned and on the third survey 55.60% were accounted for.

There were unusable returns in each survey. These were due to people leaving the specified geographical area or leaving the profession for retirement or other endeavors. Several were returned as undeliverable. Therefore, in Table I the "% Reported" and the "% Accounted for" are not equal.

TABLE II

Table II displays the data amassed from the total returned questionnaires of 417. The respondents indicated their opinions as to the necessity of a sanitarian aide to attain each listed competency. These CNF's are arranged in descending order of importance.

TABLE II

COMPETENCY NEED FACTORS IN DECENDING ORDER
OF IMPORTANCE BY THE TOTAL SURVEY POPULATION

| CNF | Item No | Item Description |
|---|---|---|
| 2.87 | 43 | Difference between sanitary & unsanitary conditions |
| 2.82 | 1 | Knowledge of codes |
| 2.81 | 10 | Cooperate with other departments |
| 2.80 | 2 | Public relations |
| | 5 | Dependable work habits |
| | 41 | Recognize public health nuisance |
| 2.78 | 27 | Public Health hazards of contaminated system |
| | 116 | Take legal water samples |
| 2.77 | 14 | Recognize need of disinfection |
| 2.76 | 65 | Recognize good personal hygiene |
| 2.75 | 34 | Recognize acceptable sewage installation |
| | 64 | Recognize safe and unsafe food handling procedures |
| | 138 | Recognize cross connections between water and sewage systems |
| | 191 | Recognize acceptable toilet facilities |
| 2.74 | 33 | Inspect existing sewage systems |
| | 128 | Sample chlorinated water |
| | 163 | Take legal swimming pool water samples |
| 2.73 | 60 | Control pests in food service establishments |
| 2.71 | 18 | Sanitary precautions for each type of well |
| | 23 | Routes of contamination in wells |
| | 53 | Inspect eating and drinking establishments |
| 2.71 | 205 | Accepted safeguards for various poisons |
| 2.70 | 24 | Sample water supplies |
| | 39 | Recognize sewage system failure |
| | 124 | Types of chemicals used for emergency chlorination |
| | 210 | Recognize rodent harborages |
| 2.69 | 20 | Disinfect a water system |
| | 63 | Recognize acceptable refrigeration facilities |
| | 133 | Recognize health hazards at summer camps |
| 2.68 | 3 | Write meaningful reports |
| | 17 | Recognize cross connections |
| 2.67 | 171 | Run field tests of chlorine and pH |
| 2.66 | 4 | Personal hygiene |
| | 16 | Recognize types of wells |
| | 56 | Sanitation of multi-use utensils |
| | 57 | Recognize single service utensils |
| | 276 | Recognize mosquito breeding areas |
| 2.64 | 7 | Methods of gathering and preserving evidence |
| | 54 | Recognize cross connections in plumbing |
| | 62 | Control of pathogenic organisms in food |
| | 93 | Know sanitary landfill standards |
| | 296 | Ability to recognize unclean conditions by sight and smell |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.63 | 125 | Ability to define "potable water" |
| | 211 | Know standards for storing materials to deter rodents |
| 2.62 | 193 | Ability to recognize acceptable bathing facilities |
| | 267 | Know insects of public health importance |
| 2.61 | 61 | Recognize hazardous chemicals and know their uses |
| | 135 | Understand vector control in camps |
| | 165 | Understand relationship of pH to chlorine |
| | 283 | Know proper procedures in a human rabies exposure |
| 2.60 | 190 | Ability to recognize acceptable kitchen facilities |
| | 275 | Know mosquito control methods |
| 2.59 | 15 | Run field test for disinfectant residual |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 293 | Know epidemiological procedures for zoonosis |
| 2.58 | 119 | Knowledge of techniques used to treat water |
| | 164 | Understand algae control |
| | 273 | Know materials in which flies will lay eggs |
| 2.57 | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| | 59 | Ability to evaluate cleanliness of vending machines |
| | 87 | Know proper compaction and cover procedures |
| | 173 | Understand use of chlorine, alum and soda ash |
| | 181 | Ability to take legal milk samples |
| | 203 | Know rat proofing methods |
| | 269 | Know proper use of insecticides |
| | 274 | Know sanitary storage methods of insect breeding materials |
| 2.56 | 194 | Understand the definitions in the State Housing Code |
| | 207 | Know effective rat proofing methods |
| 2.55 | 130 | Understand and apply standards for semi-public water and sewage systems |
| | 160 | Know the meaning of "High-free Residual Chlorine" |
| 2.54 | 26 | Know the procedure to seal an abandoned well |
| | 28 | Know and have the ability to apply standards to privies |
| | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| 2.53 | 289 | Know how to handle a rabid animal |
| 2.52 | 22 | Ability to inspect and recognize each type of well construction |
| | 96 | Knowledge of vector control |
| | 99 | Understand community-wide solid waste control methods |
| | 188 | Know farm storage milk temperature requirements |
| 2.51 | 51 | Understand the S.N.F. standards relative to food service equipment |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 252 | Know good housekeeping practices. |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.50 | 29 | Ability to accomplish percolation tests |
| | 123 | Ability to do a sanitary survey of water supply |
| | 262 | Know which state department is responsible in case of an an industrial accident |
| | 287 | Ability to cooperate with Humane Society |
| 2.49 | 146 | Know the mode of transmission of vector-borne diseases |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| | 198 | Know plumbing fixtures required in dwellings |
| | 209 | Know house mouse control methods |
| 2.48 | 98 | Know refuse control measure at camps and transient lodging facilities |
| | 142 | Understand and be able to explain use of pesticides in camps |
| | 225 | Know where protective clothing must be worn |
| | 226 | Know when safety equipment must be readily available |
| | 277 | Understand water ponding control as a mosquito control tool |
| | 285 | Know evidence of lack of sanitary manure storage |
| 2.46 | 186 | Know the significance of coliform bacteria in pasteurized milk |
| | 192 | Ability to recognize acceptable sleeping facilities |
| | 196 | Know the responsibilities of occupants of dwelling |
| | 272 | Know intermediate hosts of insects of public health importance |
| | 294 | Know modes of transmission for salmonella from pets to human |
| 2.45 | 8 | Knowledge of enforcement procedures |
| | 85 | Know how to control blow paper |
| | 200 | Know meaning of deteriorated and dilapidated |
| | 256 | Ability to work with plant safety office |
| 2.44 | 172 | Know requirements of safety equipment |
| | 208 | Know diseases spread by rodents to man |
| | 258 | Recognize conditions causing disabilities and accidents |
| | 266 | Know major disease spread to man by insect |
| 2.43 | 195 | Know the responsibilities of owners of dwelling |
| | 295 | Know the route of infection transmission in nursing homes |
| 2.42 | 25 | Ability to interpret water supply analysis reports |
| | 71 | Name five major sources of air pollution |
| | 81 | Understand air pollution warnings, alerts, and emergencies |
| | 114 | Know the level of decibels that causes some permanent hearing loss |
| | 117 | Know the functions of a reservoir |
| | 132 | Ability to apply sanitary standards to migratory labor camps |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| | 152 | Understand the difference between aerobic and anaerobic bacteria |
| | 178 | Know bacterial and chemical standards for both raw and pasteurized milk |
| | 212 | Ability to recognize restricted substances by name |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.42 (Cont'd) | 218 | Know necessity of rat watering points |
| 2.41 | 168 | Understand bacterial standards and their application |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| 2.40 | 6 | Knowledge of the professional jargon of the discipline |
| | 35 | Know the basis of lagoon operation |
| | 97 | Knowledge of sanitation at a transfer station |
| | 144 | Recognize type and application of fire extinquishers |
| | 167 | Know diseases usually associated with natural bathing places |
| | 202 | Know toxic paint and toxic preservative materials |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 271 | Understand vector-borne disease transmission |
| 2.39 | 49 | Know proper use of herbicides and pesticides in nuisance control |
| | 78 | Know the various means used to monitor air pollution |
| | 169 | Understand recirculation systems |
| | 199 | Know regulations relative to handrails on steps |
| 2.38 | 30 | Know the relationship between soil types and effluent absorption |
| | 189 | Know required contact times and strengths of various disinfectants |
| | 215 | Know how various diseases are transmitted from rodents to man |
| 2.37 | 143 | Ability to recognize fire safety hazards in motels and hotels |
| | 197 | Ability to recognize adequate heating facilities |
| 2.36 | 38 | Know lagoon maintenance requirements |
| | 100 | Understand definition of noise as compared to sound |
| | 141 | Understand fire regulations and standards |
| | 145 | Know the reservoir of communicable disease endemic to the area |
| | 148 | Understand the relationship between wild animal population and rabies |
| | 185 | Understand relationship of cow herd health and human disease transmission |
| | 260 | Know which agents may cause respiratory disease |
| | 299 | Know proper use of pesticides in all types of institutions |
| 2.35 | 66 | Be able to define air pollution |
| | 109 | Know principal sources of community noises |
| | 110 | Understand noise prevention methods |
| | 187 | Know the significance of phosphatase in pasteurized milk |
| | 257 | Recognize agents causing disabilities |
| | 261 | Know which agents may affect the skin |
| | 279 | Know naturalistic mosquito abatement methods |
| 2.34 | 31 | Ability to read sanitary plot maps and simple blueprints |
| | 72 | Name the six pollutants specified in the Clean Air Act |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.34 (Cont'd) | 147 | Understand definitions of epidemic, endemic, pandemic, sylvan and urban |
| | 170 | Ability to interpret analysis results |
| | 220 | Know where IOSHA Laws apply and where local department has responsibility |
| | 250 | Ability to run carbon monoxide field test |
| 2.33 | 131 | Understand standards of floor space and cubic air space for occupancy |
| | 137 | Ability to recognize adequate laundry facilities in migrant labor camps |
| | 249 | Understand use of protective clothing and devices |
| | 264 | Have completed Red Cross First Aid Training |
| | 305 | Know when air gaps are required on plumbing fixtures |
| | 306 | Know sanitary methods of disposal of dressings and laboratory cultures |
| 2.32 | 74 | Know three respiratory diseases that tend to be aggravated by air pollution |
| | 259 | Know what safety devices are needed in a given situation |
| | 268 | Know life cycles of insects of public health importance |
| | 270 | Know how to calculate ppm and mix insecticides |
| | 282 | Know legal procedure to enforce local animal control code |
| | 284 | Know local requirements for restrictions of numbers of animals |
| 2.31 | 9 | Ability to be a court witness |
| | 111 | Understand noise abatement methods |
| | 219 | Understand fumigant methods |
| | 253 | Understand occupational diseases caused by harmful situations |
| 2.30 | 82 | Knowledge of soils |
| | 161 | Ability to read and evaluate a flow diagram |
| | 229 | Know where eating and smoking areas are located in a plant |
| | 304 | Know proper handling methods of soiled mops |
| 2.29 | 75 | Be able to name three air pollution control devices |
| | 204 | Know density and space requirements |
| | 217 | Know how to mix rodent baits |
| | 233 | Know what protective clothing is required in dusty conditions |
| | 239 | Understand hazards of continuous X-ray exposure |
| 2.28 | 113 | Know acceptable standards of noise levels for homes and industry |
| | 139 | Know ratio of plumbing-fixtures-to-population of day camps |
| | 162 | Know cause of mud ball in filters |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| | 201 | Know window and skylight and/or artificial light required |
| 2.27 | 127 | Understand quality control methods in water treatment plants |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| | 134 | Know how to calculate the volume of water required per person |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.27 (Cont'd) | 214 | Know tracking powders and how to use them |
| | 230 | Know what "threshold limit values" are for toxic chemicals |
| | 232 | Know significance of oral, dermal, and inhalation exposure |
| | 248 | Know what to do in case of a radioactive spill |
| | 307 | Know cleaning methods of refuse chutes and dumbwaiters |
| 2.26 | 37 | Know lagoon safety requirements |
| | 44 | Know areas of a community which exclude specific classes of animals by zoning |
| | 222 | Know the definition of noise |
| | 235 | Understand radiation exposure |
| 2.25 | 115 | Know the potential ways for increasing the usable water supply |
| | 166 | Know recommended depth of diving area to height of diving board |
| | 221 | Know what decibel range hearing loss starts |
| 2.24 | 206 | Ability to recognize Norway Rat and Roof Rat |
| | 302 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| | 309 | Understand soiled laundry handling problems in institutions |
| 2.23 | 102 | Ability to define decibels |
| | 224 | Know relationship between duration of noise exposure and decibel level |
| | 288 | Know sanitary requirements for stockyards |
| | 308 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| 2.22 | 108 | Knowledge of value of sound muffs |
| | 140 | Know space requirements for outdoor campsites |
| | 223 | Understand occupational causes of hearing loss |
| 2.21 | 32 | Ability to design and size systems to fit existing conditions |
| | 79 | Know several deleterious effects of air pollution other than health effects |
| | 151 | Understand reproduction and physiology of bacteria |
| | 182 | Understand application of the "holding tube" |
| | 286 | Understand acceptable animal feed storage |
| | 297 | Know illumination standards for institutional kitchens |
| 2.20 | 40 | Know the public health hazards of waste disposal system failure |
| | 70 | Know the effects of meteorology and topography on air pollution |
| | 303 | Understand proper location of air intake and exhaust systems |
| 2.19 | 86 | Understand the significance and control of leachate |
| | 150 | Understand the transmission of zoonosis |
| | 216 | Ability to estimate age of rodent signs |
| | 227 | Understand relationship between accident rate and housekeeping |
| | 278 | Know the flight range of various mosquitos |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.18 | 21 | Understand spring development as a domestic water source |
| | 73 | Know the local ambient air quality standards for each of the six pollutants |
| | 126 | Knowledge of the Zone of Aeration |
| 2.17 | 69 | Know what a temperature inversion is |
| | 156 | Know the general effects of light on bacteria |
| | 175 | Know how to check a leak protector valve |
| | 183 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| | 213 | Ability to estimate size of rodent population |
| | 281 | Know wild host animal of zoonosis in your area |
| 2.15 | 50 | Ability to recognize all stages of life cycles of disease vectors |
| | 101 | Understand undesirable hearing changes as result of noise levels |
| | 184 | Understand mastitis control |
| | 242 | Know effect of radiation on living tissue |
| 2.14 | 77 | Know the Ringelmann System of defining visible air pollutants |
| | 159 | Know the term "Thermal Death Time" |
| | 241 | Know who is responsible for disposal of radioactive waste |
| | 265 | Understand use of keys in insect identification |
| 2.13 | 120 | Knowledge of the Floatation Process |
| 2.12 | 236 | Ability to use dosimeter and Geiger counter |
| | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 254 | Understand physiological distress due to agents in industrial atmosphere |
| | 280 | Know zoonosis indigenous to wild life of your area |
| 2.11 | 155 | Knowledge of active and passive immunity |
| | 263 | Ability to evaluate an industrial hygiene problem |
| 2.10 | 121 | Knowledge of the Continuous Regeneration Process |
| | 300 | Know and apply occupancy standards to all types of institutions |
| 2.09 | 255 | Understand abnormal stress due to improper work methods |
| 2.07 | 112 | Understand application of sound proofing buildings and offices |
| | 231 | Understand metric system of measurements |
| | 234 | Know how to run field tests for atmospheric contamination |
| | 240 | Know acceptable disposal sites |
| | 246 | Understand the terms: Electron, Proton, Neutron |
| | 292 | Know epidemiological procedures for zoonosis |
| 2.06 | 48 | Ability to recognize noxious weeds |
| | 107 | Knowledge of acoustical or sound-absorbing walls |
| | 176 | Know how to operate a HTST flow diversion valve |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.06 (Cont'd) | 298 | Know water volume per bed and temperature standards for nursing homes |
| 2.05 | 174 | Be able to calculate and maneuver bathing load |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| 2.04 | 89 | Ability to calculate volumes of refuse and cover material |
| 2.03 | 80 | Understand the relationship between air pollutants and allergies |
| | 105 | Knowledge of frequency of noise |
| | 247 | Understand "half life" of an isotope |
| 2.02 | 47 | Know the procedures in processing citizen-initiated complaints |
| | 58 | Ability to evaluate location of vending machines |
| | 67 | Know the primary gaseous components in the atmosphere |
| | 106 | Know what an ondimeter is |
| | 157 | Knowledge of intestinal nematodes |
| 2.01 | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| 2.00 | 104 | Knowledge of pressure level of noise |
| | 122 | Knowledge of removing fluorides from water |
| 1.99 | 84 | Knowledge of acceptable roads within the landfill |
| 1.98 | 243 | Have ability to monitor radiation from X-ray machine |
| | 301 | Know methods of disinfecting operating rooms |
| 1.97 | 103 | Ability to define frequencies in cycles per second |
| 1.96 | 118 | Know how to study the flood characteristics of a stream |
| | 158 | Knowledge of Cestodes and Trematodes |
| | 244 | Know fission from fusion |
| 1.95 | 11 | Ability to calculate volumes of water required at an installation |
| 1.94 | 19 | Know how to run a "yield and drawdown" test |
| | 36 | Ability to size lagoons to a given system |
| 1.93 | 55 | Ability to size kitchen ventilation systems |
| | 291 | Know psittacosis control procedures |
| 1.90 | 12 | Ability to calculate peak load of a water system |
| | 88 | Ability to evaluate compaction equipment |
| 1.88 | 68 | Know what the adiabatic lapse rate is |
| 1.87 | 13 | Ability to size systems to meet load requirements |
| | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| 1.86 | 180 | Know how to calculate logarithmic average of bacterial counts |
| 1.84 | 237 | Understand isotopic forms of elements |

TABLE II - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.82 | 154 | Knowledge of the Fluorescent Antibody Test |
| 1.79 | 92 | Estimate net weight on volume of loads |
| 1.78 | 94 | Knowledge of a Systems Analysis Concept |
| | 95 | Knowledge of Volume Reductions Systems |
| 1.64 | 46 | Ability to estimate approximate age of fowl |
| | 90 | Ability to route pickup crews |
| 1.51 | 45 | Ability to recognize sex of animals and fowl |
| 1.49 | 83 | Ability to operate landfill equipment |
| 1.45 | 91 | Know maintenance procedures on equipment |

Table II reveals six items with a CNF of 2.80 or above. The most needed skill as judged by the total population is the ability to differentiate between sanitary and unsanitary conditions by the sanitarian aide (#43). Closely following in descending order are knowledge of codes (#1), ability to cooperate with other departments or agencies (#10), public relations (#2), dependable work habits (#5) and the ability to recognize public health nuisances (#41). The least desirable competencies needed by the sanitarian aide in the opinions of the respondents are those with a CNF rating below 2.00. Table II shows twenty-eight items placed in this category. Starting with the least important in the opinion of the total survey population they are: Knowledge of maintenance procedures on landfill equipment (#91), ability to operate landfill equipment (#83), ability to recognize sex of animals and fowl (#45), ability to estimate approximate age of fowl (#46), ability to route garbage pickup crews (#90), knowledge of a volume reduction system (#95), knowledge of systems concept analysis (#94), and ability to esitmate net weight or volume of refuse on loads coming to landfill (#92). Other items in this category are found in Table II.

Table III provides the data gathered from the 147 questionnaires received from Iowa board of health chairmen that responded to the questionnaire.

TABLE III

COMPETENCY NEED FACTORS IN DESCENDING ORDER
OF IMPORTANCE BY
IOWA BOARD OF HEALTH CHAIRMEN

| CNF | Item No. | Item Description |
|---|---|---|
| 2.84 | 165 | Understand relationship of pH to chlorine |
| 2.83 | 1 | Knowledge of codes, laws, rules and regulations pertaining to work |
| 2.82 | 143 | Ability to recognize fire safety hazards in motels and hotels |
| 2.80 | 116 | Ability to take legal water samples |
| 2.78 | 128 | Ability to sample chlorinated water |
| | 205 | Know accepted safeguards for various poisons |
| 2.77 | 34 | Ability to recognize acceptable installation |
| 2.76 | 191 | Ability to recognize acceptable toilet facilities |
| 2.75 | 2 | Ability with public relations with public |
| | 4 | Good personal hygiene |
| | 43 | Ability to differentiate between sanitary and unsanitary conditions |
| 2.74 | 138 | Recognize cross connections between water and sewage systems |
| 2.72 | 23 | Know the possible routes of contamination in each type of well |
| | 24 | Ability to sample water supplies |
| | 40 | Know the public health hazards of waste disposal system failure |
| 2.71 | 5 | Dependable work habits |
| 2.70 | 18 | Know the sanitary precautions for each type of well |
| | 39 | Ability to recognize system failure |
| | 93 | Know sanitary landfill standards |
| 2.69 | 14 | Ability to recognize need of disinfection |
| | 16 | Ability to recognize different types of wells |
| | 27 | Know the public health hazards of a contaminated system |
| | 33 | Ability to inspect existing systems |
| | 41 | Ability to recognize public health aspects of a nuisance |
| | 296 | Ability to recognize unclean conditions by sight and smell |
| 2.68 | 119 | Knowledge of techniques used to treat water |
| | 133 | Recognize health hazards at summer camps |
| 2.66 | 20 | Know how to disinfect a water source and system |
| | 163 | Ability to take legal swimming pool water samples |
| 2.64 | 124 | Knowledge of the types of chemicals used for emergency chlorination |
| | 130 | Understand and apply standards for semi-public water and sewage systems |
| | 276 | Ability to recognize mosquito breeding areas |
| | 289 | Know how to handle a rabid animal |
| 2.62 | 193 | Ability to recognize acceptable bathing facilities |
| | 194 | Understand the definitions in the State Housing Code |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.61 | 64 | Recognize safe and unsafe food handling procedures |
| 2.60 | 99 | Understand community-wide solid waste control methods |
| | 123 | Ability to do a sanitary survey of water supply |
| | 171 | Ability to run field tests for chlorine and pH |
| | 190 | Ability to recognize acceptable kitchen facilities |
| | 203 | Know rat proofing methods |
| | 226 | Know when safety equipment must be readily available |
| | 258 | Recognize conditions causing disabilities and accidents |
| | 264 | Have completed Red Cross First Aid Training |
| 2.59 | 10 | Ability to cooperate and work with other departments and agencies |
| | 22 | Ability to inspect and recognize each type of well construction |
| | 65 | Recognize good personal hygiene |
| 2.58 | 198 | Know plumbing fixtures required in dwellings |
| | 260 | Know which agents may cause respiratory disease |
| | 283 | Know proper procedures in human rabies exposure |
| 2.57 | 3 | Ability to write meaningful and intelligent reports |
| | 7 | Understand methods of gathering and preserving evidence |
| | 15 | Ability to run field test for disinfectant residual |
| | 62 | Understand the control of pathogenic organisms food service establishments |
| 2.56 | 63 | Recognize acceptable refrigeration facilities |
| | 71 | Name five major sources of air pollution |
| 2.56 (cont'd) | 144 | Recognize type and application of fire extinguishers |
| | 164 | Understand algae control |
| | 210 | Ability to recognize rodent harborages |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 261 | Know which agents affect the skin |
| | 267 | Know insects of public health importance |
| | 274 | Know sanitary storage methods of insect breeding materials |
| | 293 | Know how to get samples in safe, legal manner |
| 2.54 | 17 | Ability to recognize cross connections |
| | 53 | Ability to inspect eating and drinking establishments under applicable codes |
| | 60 | Understand control of pests in food service establishments |
| | 87 | Know proper compaction and cover procedures |
| | 92 | Estimate net weight on volume of loads |
| | 125 | Ability to define "potable water" |
| | 141 | Understand fire regulations and standards |
| | 142 | Understand and be able to explain use of pesticides in camps |
| | 173 | Understand use of chlorine, alum and soda ash |
| | 181 | Ability to take legal milk samples |
| 2.53 | 211 | Know standards for storing materials to deter rodents |
| | 220 | Know where IOSHA Laws apply and where local department has responsibility |
| | 257 | Recognize agents causing disabilities |
| | 262 | Know which state department is responsible in case of an industrail accident |
| | 273 | Know materials in which flies will lay eggs |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.52 | 26 | Know the procedure to seal an abandoned well |
| | 47 | Know the procedures in processing citizen-initiated complaints |
| | 51 | Understand the S.N.F. standards relative to food service equipment |
| 2.51 | 25 | Ability to interpret water supply analysis reports |
| | 256 | Ability to work with plant safety officer |
| | 287 | Ability to cooperate with Humane Society |
| 2.50 | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| | 78 | Know the various means used to monitor air pollution |
| | 81 | Understand air pollution warnings, alerts and emergencies |
| 2.49 | 28 | Know and have the ability to apply standards to privies |
| | 207 | Know effective rat proofing methods |
| | 225 | Know where protective clothing must be work |
| | 259 | Know what safety devices are needed in a given situation |
| | 272 | Know intermediate hosts of insects of public health importance |
| | 277 | Understand water ponding control as a mosquito control tool |
| 2.48 | 6 | Knowledge of the professional jargon of the discipline |
| | 29 | Ability to accomplish percolation tests |
| | 30 | Know the relationship between soil types and effluent absorption |
| | 59 | Ability to evaluate cleanliness of vending machines |
| | 98 | Know refuse control measure at camps and transient lodging facilities |
| 2.48 (cont'd) | 160 | Know the meaning of High-free Residual Chlorine" |
| 2.47 | 208 | Know diseases spread by rodents to man |
| | 266 | Know major disease spread to man by insect |
| | 270 | Know how to calculate ppm and mix insecticides |
| | 295 | Know the route of infection transmission in nursing homes |
| 2.46 | 31 | Ability to read sanitary plot maps and simple blueprints |
| | 61 | Recognize hazardous chemicals and know their uses |
| | 115 | Know the potential ways for increasing the usable water suppl |
| | 117 | Know the functions of a reservoir |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| | 132 | Ability to apply sanitary standards to migratory labor camps |
| | 188 | Know farm storage mild temperature requirements |
| 2.45 | 35 | Know the basis of lagoon operati |
| | 57 | Recognize acceptable single service utensils |
| 2.44 | 109 | Know principal sources of community noises |
| | 114 | Know the level of decibels that causes some permanent hearing loss |
| | 131 | Understand standards of floor space and cubic air space for occupancy |
| | 178 | Know bacterial and chemical standards for both raw and |
| | 189 | Know required contact times and strengths of various disinfectants |
| | 196 | Know the responsibilities of occupants of dwelling |
| | 230 | Know what "threshold limit values" are for toxic chemicals |
| | 299 | Know proper use of pesticides in all types of institutions |
| | 307 | Know cleaning methods of refuse chutes and dumbwaiters |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.43 | 37 | Know lagoon safety requirements |
| | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| 2.42 | 100 | Understand definition of noise as compared to sound |
| | 110 | Understand noise prevention methods |
| | 127 | Understand quality control methods in water treatment plants |
| | 135 | Understand vector control in camps |
| | 195 | Know the rsponsibilities of owners of dwelling |
| | 200 | Know meaning of deteriorated and dilapidated |
| | 209 | Know house mouse control methods |
| | 212 | Ability to recognize restricted substances by name |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 233 | Know what protective clothing is required in dusty conditions |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| | 252 | Know good housekeeping practices |
| 2.41 | 56 | Understand sanitization of multi-use utensils |
| 2.40 | 72 | Name the six pollutants specified in the Clean Air Act |
| | 85 | Know how to control blow paper |
| | 162 | Know cause of mud ball in filters |
| | 186 | Know the significance of coliform bacteria in pasteurized milk |
| | 217 | Know how to mix rodent baits |
| | 219 | Understand fumigant methods |
| | 232 | Know significance of oral, dermal, and inhalation exposure |
| | 253 | Understand occupational diseases caused by harmful situations |
| 2.40 (cont'd) | 282 | Know legal procedure to enforce local animal control code |
| 2.39 | 54 | Ability to recognize cross connections in plumbing |
| 2.38 | 38 | Know lagoon maintenance requirements |
| | 82 | Knowledge of soils |
| | 139 | Know ratio of plumbing-fixtures-to-population of day camps |
| | 172 | Know requirements of safety equipment |
| | 192 | Ability to recognize acceptable sleeping facilities |
| | 215 | Know how various diseases are transmitted from rodents to man |
| | 285 | Know evidence of lack of sanitary manure storage |
| | 294 | Know modes of transmission for salmonella from pets to human |
| 2.36 | 97 | Knowledge of sanitation at a transfer station |
| | 111 | Understand noise abatement methods |
| | 137 | Ability to recognize adequate laundry facilities in migrant labor camps |
| | 146 | Know the mode of transmission of vector-borne diseases |
| | 168 | Understand bacterial standards and their application |
| | 248 | Know what to do in case of a radiactive spill |
| | 249 | Understand use of protective clothing and devices |
| 2.35 | 49 | Know proper use of herbicides and pesticides in nuisance control |
| 2.34 | 8 | Knowledge of enforcement procedures |
| | 66 | Be able to define air pollution |
| | 169 | Understand recirculation systems |
| 2.33 | 223 | Understand occupational causes of hearing loss |
| | 250 | Ability to run carbon monoxide field test |
| | 271 | Understand vector-borne disease transmission |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.32 | 96 | Knowledge of vector control |
| | 108 | Knowledge of value of sound muffs |
| | 145 | Know the reservoir of communicable disease endemic to the area |
| | 167 | Know diseases usually associated with natural bathing places |
| | 306 | Know sanitary methods of disposal of dressings and laboratory cultures |
| 2.31 | 218 | Know necessity of rat watering points |
| | 268 | Know life cycles of insects of public health importance |
| | 284 | Know local requirements for restrictions of numbers of animals |
| 2.30 | 79 | Know several deleterious effects of air pollution other than health effects |
| | 113 | Know acceptable standards of noise levels for homes and industry |
| | 161 | Ability to read and evaluate a flow diagram |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| | 197 | Ability to recognize adequate heating facilities |
| 2.29 | 199 | Know regulations relative to handrails on steps |
| | 236 | Ability to use dosimeter and Geiger counter |
| | 239 | Understand hazards of continuous X-ray exposure |
| 2.28 | 89 | Ability to calculate volumes of refuse and cover material |
| | 121 | Knowledge of the Continuous Regeneration Process |
| | 152 | Understand the difference between aerobic and anaerobic bacteria |
| 2.27 | 229 | Know where eating and smoking areas are located in a plant |
| | 288 | Know sanitary requirements for stockyards |
| 2.26 | 70 | Know the effects of meteorology and topography on air pollution |
| | 73 | Know the local ambient air quality standards for each of t six pollutants |
| | 140 | Know space requirements for out door campsites |
| | 166 | Know recommended depth of divin area to height of diving board |
| | 187 | Know the significance of phosphatase in pasteurized milk |
| 2.24 | 122 | Knowledge of removing fluorides from water |
| | 222 | Know the definition of noise |
| | 263 | Ability to evaluate an industrial hygiene problem |
| | 302 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| 2.22 | 120 | Knowledge of the Floatation Process |
| | 147 | Understand definitions of epidemic, endemic, pandemic, sylvar and urban |
| | 170 | Ability to interpret analysis results |
| | 182 | Understand application of the "holding tube" |
| | 254 | Understand physiological distres due to agents in industrial atmosphere |
| | 275 | Know mosquito control methods |
| | 279 | Know naturalistic mosquito abate ment methods |
| | 309 | Understand soiled laundry handling problems in institutions |
| 2.21 | 44 | Know areas of a community which exclude specific classes of animals by zoning |
| 2.20 | 88 | Ability to evaluate compaction equipment |
| | 126 | Knowledge of the Zone of Aeratio |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.20 (cont'd) | 134 | Know how to calculate the volume of water required per person |
| | 183 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| | 235 | Understand radiation exposure |
| | 255 | Understand abnormal stress due to improper work methods |
| | 308 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| 2.19 | 13 | Ability to size systems to meet load requirements |
| | 32 | Ability to design and size systems to fit existing conditions |
| 2.18 | 9 | Ability to be a court witness |
| | 175 | Know how to check a leak protector valve |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| | 204 | Know density and space requirements |
| | 214 | Know tracking powders and how to use them |
| | 242 | Know effect of radiation on living tissue |
| | 280 | Know zoonosis indigenous to wild life of your area |
| | 286 | Understand acceptable animal feed storage |
| 2.17 | 55 | Ability to size kitchen ventilation systems |
| 2.16 | 80 | Understand the relationship between air pollutants and allergies |
| | 102 | Ability to define decibels |
| | 159 | Know the term "Thermal Death Time" |
| | 202 | Know toxic paint and toxic preservative materials |
| | 221 | Know what decibel range hearing loss starts |
| | 224 | Know the relationship between duration of noise exposure and decibel level |
| 2.16 (cont'd) | 303 | Understand proper location of air intake and exhaust systems |
| 2.14 | 101 | Understand undesirable hearing changes as result of noise levels |
| | 150 | Understand the transmission of zoonosis |
| | 156 | Know the general effect of light on bacteria |
| 2.13 | 227 | Understand relationship between accident rate and housekeeping |
| | 231 | Understand metric system of measurements |
| | 240 | Know acceptable disposal sites |
| | 241 | Know who is responbile for disposal of radioactive waste |
| | 278 | Know the flight range of various mosquitos |
| 2.12 | 36 | Ability to size lagoons to a given system |
| | 77 | Know the Ringelmann System of defining visible air pollutants |
| | 86 | Understand the significance and control of leachate |
| | 155 | Knowledge of active and passive immunity |
| 2.10 | 118 | Know how to study the flood characteristics of a stream |
| | 157 | Knowledge of intestinal nematodes |
| 2.09 | 216 | Ability to estimate age of rodent signs |
| | 234 | Know how to run field tests for atmospheric contamination |
| 2.08 | 11 | Ability to calculate volumes of water required at an installation |
| | 58 | Ability to evaluate location of vending machines |
| | 75 | Be able to name three air pollution control devices |
| | 84 | Knowledge of acceptable roads within the landfill |
| 2.07 | 213 | Ability to estimate size of rodent population |
| | 297 | Know illumination standards for institutional kitchens |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.07 (cont'd) | 300 | Know and apply occupancy standards to all types of institutions |
| | 305 | Know when air gaps are required on plumbing fixtures |
| 2.06 | 50 | Ability to recognize all stages of life cycles of disease vectors |
| | 69 | Know what a temperature inversion is |
| | 105 | Knowledge of frequency of noise |
| | 158 | Knowledge of Cestodes and Trematodes |
| | 176 | Know how to operate a HTST flow diversion valve |
| | 184 | Understand mastitis control |
| 2.04 | 19 | Know how to run a "yield and drawdown" test |
| | 48 | Ability to recognize noxious weeds |
| | 67 | Know the primary gaseous components in the atmosphere |
| | 94 | Knowledge of a Systems Analysis Concept |
| | 174 | Be able to calculate and maneuver bathing load |
| | 206 | Ability to recognize Norway Rat and Roof Rat |
| 2.02 | 74 | Know three respiratory diseases that tend to be aggravated by air pollution |
| | 106 | Know what an ondimeter is |
| | 180 | Know how to calculate logarithmic average of bacterial counts |
| | 265 | Understand use of keys in insect identification |
| 2.00 | 104 | Knowledge of pressure level of noise |
| | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 244 | Know fission from fusion |
| | 269 | Know proper use of insecticides |
| | 298 | Know water volume per bed and temperature standards for nursing home |
| 1.98 | 103 | Ability to define frequencies in cycles per second |
| | 292 | Know epidemiological procedures for zoonosis |
| | 301 | Know methods of disinfecting operating rooms |
| 1.96 | 21 | Understand spring development as a domestic water source |
| | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| 1.92 | 12 | Ability to calculate peak load of a water system |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| 1.91 | 281 | Know wild host animal of zoonosis in your area |
| | 291 | Know psittacosis control procedures |
| 1.90 | 148 | Understand the relationship between wild animal population and rabies |
| | 154 | Knowledge of the Fluorescent Antibody Test |
| 1.88 | 68 | Know what the adiabatic lapse rate is |
| | 95 | Knowledge of Volume Reductions Systems |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| 1.87 | 243 | Have ability to monitor radiatic from X-ray machine |
| 1.84 | 151 | Understand reproduction and physiology of bacteria |
| 1.82 | 90 | Ability to route pickup crews |
| | 247 | Understand "half life" of an isotope |

TABLE III - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.80 | 201 | Know window and skylight and/ or artificial light required |
| 1.78 | 83 | Ability to operate landfill equipment |
| 1.73 | 237 | Understand isotopic forms of elements |
| | 246 | Understand the term: Electron, Proton, Neutron |
| 1.66 | 112 | Understand application of sound proofing buildings and offices |
| 1.62 | 91 | Know maintenance procedures on equipment |
| 1.59 | 45 | Ability to recognize sex of animals and fowl |
| 1.58 | 107 | Knowledge of acoustical or sound-absorbing walls |
| 1.51 | 304 | Know proper handling methods of soiled mops |
| 1.46 | 46 | Ability to estimate approximate age of fowl |
| 1.42 | 185 | Understand relationship of cow herd health and human disease transmission |

A study of the responses from this population sub-group indicates that four items scored a CNF above 2.79. These are: Ability to take legal water samples (#116), ability to recognize fire and safety hazards in transient lodging (#143), knowledge of applicable codes, laws, rules, etc. (#1), and understand relationship between pH and chlorine residual in potable water. There are 31 items with a CNF below 2.00 as reported by this population sub-group. The least of these are: Understanding the dairy cow herd health to human disease (#185), ability to estimate approximate age of fowl (#46), know proper method of handling soiled mops in institutions (#304). The other items as listed by item number 107, 45, 91, 112, 246, 237, and 83 show a CNF of less than 2.00.

Table IV assembles the data from the 41 questionnaires returned by the Iowa health department administrators included in the survey.

TABLE IV

COMPETENCY NEED FACTORS IN DECENDING ORDER
OF IMPORTANCE BY IOWA BOARD OF HEALTH ADMINISTRATORS

| CNF | Item No. | Item Description |
|---|---|---|
| 3.00 | 2 | Public relations |
| | 5 | Dependable work habits |
| | 24 | Sample water supplies |
| | 27 | Know the public health hazards of a contaminated system |
| | 40 | Know the public health hazards of waste disposal system failure |
| | 43 | Ability to differentiate between sanitary and unsanitary conditions |
| 2.91 | 4 | Good personal hygiene |
| | 17 | Ability to recognize cross connections |
| | 29 | Ability to accomplish percolation tests |
| | 33 | Ability to inspect existing system |
| | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| | 53 | Ability to inspect eating and drinking establishments under applicable codes |
| 2.87 | 131 | Understand standards of floor space and cubic air space for occupancy |
| | 163 | Ability to take legal swimming pool water samples |
| | 191 | Ability to recognize acceptable toilet facilities |
| | 210 | Ability to recognize rodent harborages |
| 2.82 | 1 | Knowledge of codes, laws, rules and regulations pertaining to work |
| | 7 | Understand methods of gathering and preserving evidence |
| | 14 | Ability to recognize need of disinfection |
| | 18 | Know the sanitary precautions for each type of well |
| | 20 | Know how to disinfect a water source and system |
| | 34 | Ability to recognize acceptable installation |
| | 39 | Recognize sewage system failure |
| | 41 | Ability to recognize public health aspects of a nuisance |
| | 47 | Know the procedures in processing citizen-initiated complaints |
| | 54 | Ability to recognize cross connections in plumbing |
| | 56 | Understand sanitization of multi-use utensils |
| | 57 | Recognize acceptable single service utensils |
| | 59 | Ability to evaluate cleanliness of vending machines |
| | 60 | Understand control of pests in food service establishments |
| | 63 | Recognize acceptable refrigeration facilities |
| | 64 | Recognize safe and unsafe food handling procedures |
| | 65 | Recognize good personal hygiene |
| 2.80 | 85 | Know how to control blow paper |
| | 138 | Recognize cross connections between water and sewage systems |
| | 171 | Ability to run field tests for chlorine and pH |
| | 186 | Know the significance of coliform bacteria in pasteurized milk |
| | 193 | Ability to recognize acceptable bathing facilities |
| 2.73 | 10 | Ability to cooperate and work with other departments and agencies |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.73 (Cont'd) | 15 | Ability to run field test for disinfectant residual |
| | 16 | Ability to recognize different types of wells |
| | 26 | Know the procedure to seal an abandoned well |
| | 28 | Know and have the ability to apply standards to privies |
| | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| | 61 | Recognize hazardous chemicals and know their uses |
| | 62 | Understand the control of pathogenic organisms food service establishments |
| | 93 | Know sanitary landfill standards |
| | 97 | Knowledge of sanitation at a transfer station |
| | 125 | Ability to define "potable water" |
| | 128 | Ability to sample chlorinated water |
| | 135 | Understand vector control in camps |
| | 164 | Understand algae control |
| | 165 | Understand relationship of pH to chlorine |
| | 187 | Know the significance of phosphatase in pasteurized milk |
| | 192 | Ability to recognize acceptable sleeping facilities |
| | 199 | Know regulations relative to handrails on steps |
| | 205 | Know accepted safeguards for various poisons |
| | 211 | Know standards for storing materials to deter rodents |
| 2.66 | 96 | Knowledge of vector control |
| | 124 | Knowledge of the types of chemicals used for emergency chlorination |
| | 133 | Recognize health hazards at summer camps |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| | 173 | Understand use of chlorine, alum and soda ash |
| | 182 | Understand application of the "holding tube" |
| | 185 | Understand relationship of cow herd health and human disease transmission |
| | 188 | Know farm storage milk temperature requirements |
| | 190 | Ability to recognize acceptable kitchen facilities |
| | 194 | Understand the definitions in the State Housing Code |
| | 195 | Know the responsibilities of owners of dwelling |
| | 196 | Know the responsibilities of occupants of dwelling |
| | 198 | Know plumbing fixtures required in dwellings |
| | 204 | Know density and space requirements |
| 2.65 | 3 | Ability to write meaningful and intelligent reports |
| | 22 | Ability to inspect and recognize each type of well construction |
| | 23 | Know the possible routes of contamination in each type of well |
| | 30 | Know the relationship between soil types and effluent absorption |
| | 51 | Understand the S.N.F. standards relative to food service equipment |
| 2.60 | 81 | Understand air pollution warnings, alerts and emergencies |
| | 87 | Know proper compaction and cover procedures |
| | 130 | Understand and apply standards for semi-public water and sewage systems |
| | 181 | Ability to take legal milk samples |
| | 197 | Ability to recognize adequate heating facilities |
| | 200 | Know meaning of deteriorated and dilapidated |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.60 (Cont'd) | 267 | Know insects of public health importance |
| | 273 | Know materials in which flies will lay eggs |
| | 276 | Ability to recognize mosquito breeding areas |
| | 283 | Know proper procedures in a human rabies exposure |
| | 285 | Know evidence of lack of sanitary manure storage |
| | 287 | Ability to cooperate with Humane Society |
| | 293 | Know how to get samples in safe, legal manner |
| 2.55 | 6 | Knowledge of the professional jargon of the discipline |
| | 8 | Knowledge of enforcement procedures |
| | 37 | Know lagoon safety requirements |
| | 38 | Know lagoon maintenance requirements |
| 2.53 | 98 | Know refuse control measure at camps and transient lodging facilities |
| | 168 | Understand bacterial standards and their application |
| | 170 | Ability to interpret analysis results |
| | 178 | Know bacterial and chemical standards for both raw and pasteurized milk |
| | 201 | Know window and skylight and/or artificial light required |
| | 203 | Know rat proofing methods |
| | 207 | Know effective rat proofing methods |
| | 209 | Know house mouse control methods |
| | 218 | Know necessity of rat watering points |
| | 252 | Know good housekeeping practices |
| | 274 | Know sanitary storage methods of insect breeding materials |
| | 296 | Ability to recognize unclean conditions by sight and smell |
| 2.49 | 99 | Understand community-wide solid waste control methods |
| 2.47 | 78 | Know the various means used to monitor air pollution |
| | 102 | Ability to define decibels |
| | 119 | Knowledge of techniques used to treat water |
| | 121 | Knowledge of the Continuous Regeneration Process |
| | 137 | Ability to recognize adequate laundry facilities in migrant labor camps |
| | 142 | Understand and be able to explain use of pesticides in camps |
| | 146 | Know the mode of transmission of vector-borne disease |
| | 148 | Understand the relationship between wild animal population and rabies |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| | 167 | Know diseases usually associated with natural bathing places |
| | 189 | Know required contact times and strengths of various disinfectants |
| | 202 | Know toxic paint and toxic preservative materials |
| | 212 | Ability to recognize restricted substances by name |
| | 269 | Know proper use of insecticides |
| | 275 | Know mosquito control methods |
| | 289 | Know how to handle a rabid animal |
| | 304 | Know proper handling methods of soiled mops |
| 2.46 | 49 | Know proper use of herbicides and pesticides in nuisance control |
| 2.40 | 71 | Name five major sources of air pollution |
| | 75 | Be able to name three air pollution control devices |
| | 100 | Understand definition of noise as compared to sound |
| | 109 | Know principal sources of community noises |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.40 (Cont'd) | 117 | Know the funtions of a reservoir |
| | 123 | Ability to do a sanitary survey of water supply |
| | 143 | Ability to recognize fire safety hazards in motels and hotels |
| | 144 | Recognize type and application of fire extinguishers |
| | 145 | Know the reservoir of communicable disease endemic to the area |
| | 150 | Understand the transmission of zoonosis |
| | 160 | Know the meaning of "High-free Residual Chlorine" |
| | 161 | Ability to read and evaluate a flow diagram |
| | 216 | Ability to estimate age of rodent signs |
| | 225 | Know where protective clothing must be worn |
| | 226 | Know when safety equipment must be readily available |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 235 | Understand radiation exposure |
| | 250 | Ability to run carbon monoxide field test |
| | 277 | Understand water ponding control as a mosquito control tool |
| | 284 | Know local requirements for restrictions of numbers of animals |
| | 286 | Understand acceptable animal feed storage |
| | 294 | Know modes of transmission for salmonella from pets to human |
| | 305 | Know when air gaps are required on plumbing fixtures |
| 2.35 | 9 | Ability to be a court witness |
| | 25 | Ability to interpret water supply analysis reports |
| | 31 | Ability to read sanitary plot maps and simple blueprints |
| | 32 | Ability to design and size systems to fit existing conditions |
| | 35 | Know the basis of lagoon operation |
| | 44 | Know areas of a community which exclude specific classes of animals by zoning |
| 2.33 | 66 | Be able to define air pollution |
| | 72 | Name the six pollutants specified in the Clean Air Act |
| | 77 | Know the Ringelmann System of defining visible air pollutants |
| | 86 | Understand the significance and control of leachate |
| | 108 | Knowledge of value of sound muffs |
| | 113 | Know the acceptable standards of noise levels for homes and industry |
| | 114 | Know the level of decibels that causes some permanent hearing loss |
| | 126 | Knowledge of the Zone of Aeration |
| | 127 | Understand quality control methods in water treatment plants |
| | 132 | Ability to apply sanitary standards to migratory labor camps |
| | 134 | Know how to calculate the volume of water required per person |
| | 139 | Know ratio of plumbing-fixtures-to-population of day camps |
| | 147 | Understand definitions of epidemic, endemic, pandemic, sylvan and urban |
| | 151 | Understand reproduction and physiology of bacteria |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.33 (Cont'd) | 152 | Understand the difference between aerobic and anaerobic bacteria |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 184 | Understand mastitis control |
| | 208 | Know diseases spread by rodents to man |
| | 214 | Know tracking powders and how to use them |
| | 236 | Ability to use dosimeter and Geiger counter |
| | 239 | Understand hazards of continuous X-ray exposure |
| | 244 | Know fission from fusion |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| | 248 | Know what to do in case of a radioactive spill |
| | 249 | Understand use of protective clothing and devices |
| | 253 | Understand occupational diseases caused by harmful situations |
| | 258 | Recognize conditions causing disabilities and accidents |
| | 266 | Know major disease spread to man by insect |
| | 272 | Know intermediate hosts of insects of public health importance |
| | 279 | Know naturalistic mosquito abatement methods |
| | 282 | Know legal procedure to enforce local animal control code |
| | 295 | Know the route of infection transmission in nursing homes |
| 2.28 | 50 | Ability to recognize all stages of life cycles of disease vectors |
| 2.27 | 69 | Know what a temperature inversion is |
| | 73 | Know the local ambient air quality standards for each of the six pollutants |
| | 74 | Know three respiratory diseases that tend to be aggravated by air pollution |
| | 105 | Knowledge of frequency of noise |
| | 110 | Understand noise prevention methods |
| | 111 | Understand noise abatement methods |
| | 140 | Know space requirements for outdoor campsites |
| | 175 | Know how to check a leak protector valve |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| | 183 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| | 227 | Understand relationship between accident rate and housekeeping |
| | 233 | Know what protective clothing is required in dusty conditions |
| | 247 | Understand "half life" of an isotope |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 256 | Ability to work with plant safety officer |
| | 262 | Know which state department is responsible in case of an industrial accident |
| | 264 | Have completed Red Cross First Aid Training |
| | 268 | Know life cycles of insects of public health importance |
| | 270 | Know how to calculate ppm and mix insecticides |
| | 271 | Understand vector-borne disease transmission |
| | 278 | Know the flight range of various mosquitos |
| | 288 | Know sanitary requirements for stockyards |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.27 (Cont'd) | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| | 306 | Know sanitary methods of disposal of dressings and laboratory cultures |
| | 307 | Know cleaning methods of refuse chutes and dumb waiters |
| | 309 | Understand soiled laundry handling problems in institutions |
| 2.25 | 48 | Ability to recognize noxious weeds |
| 2.20 | 101 | Understand undesirable hearing changes as result of noise levels |
| | 112 | Understand application of sound proofing buildings and offices |
| | 141 | Understand fire regulations and standards |
| | 156 | Know the general effects of light on bacteria |
| | 206 | Ability to recognize Norway Rat and Roof Rat |
| | 215 | Know how various diseases are transmitted from rodents to man |
| | 221 | Know what decibel range hearing loss starts |
| | 222 | Know the definition of noise |
| | 232 | Know the significance of oral, dermal, and inhalation exposure |
| | 242 | Know effect of radiation on living tissue |
| | 246 | Understand the term: Electron, Proton, Neutron |
| | 257 | Recognize agents causing disabilities |
| | 298 | Know water volume per bed and temperature standards for nursing homes |
| | 303 | Understand proper location of air intake and exhaust systems |
| 2.13 | 70 | Know the effects of meteorology and topography on air pollution |
| | 82 | Knowledge of Soils |
| | 84 | Knowledge of acceptable roads within the landfill |
| | 106 | Know what an ondimeter is |
| | 174 | Be able to calculate and maneuver bathing load |
| | 213 | Ability to estimate size of rodent population |
| | 224 | Know relationship between duration of noise exposure and decibel level |
| | 229 | Know where eating and smoking areas are located in a plant |
| | 259 | Know what safety devices are needed in a given situation |
| | 260 | Know which agents may cause respiratory disease |
| | 280 | Know zoonosis indigenous to wild life of your area |
| | 281 | Know wild host animal of zoonosis in your area |
| | 291 | Know Psittacosis control procedures |
| | 297 | Know illumination standards for institutional kitchens |
| | 299 | Know proper use of pesticides in all types of institutions |
| | 308 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| 2.09 | 58 | Ability to evaluate location of vending machines |
| 2.07 | 103 | Ability to define frequencies in cycles per second |
| | 104 | Knowledge of pressure level of noise |
| | 115 | Know the potential ways for increasing the usable water supply |
| | 116 | Ability to take legal water samples |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.07 (Cont'd) | 155 | Knowledge of active and passive immunity |
| | 162 | Know cause of mud ball in filters |
| | 166 | Know recommended depth of diving area to height of diving board |
| | 180 | Know how to calculate logarithmic average of bacterial counts |
| | 219 | Understand fumigant methods |
| | 220 | Know where IOSHA Laws apply and where local department has responsibility |
| | 265 | Understand use of keys in insect indentification |
| | 292 | Know epidemiological procedures for zoonosis |
| | 300 | Know and apply occupancy standards to all types of institutions |
| | 302 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| 2.00 | 21 | Understand spring development as a domestic water source |
| | 67 | Know the primary gaseous components in the atmosphere |
| | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| | 80 | Understand the relationship between air pollutants and allergies |
| | 118 | Know how to study the flood characteristics of a stream |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| | 159 | Know the term "Thermal Death Time" |
| | 176 | Know how to operate a HTST flow diversion valve |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| | 217 | Know how to mix rodent baits |
| | 223 | Understand occupational causes of hearing loss |
| | 237 | Understand isotopic forms of elements |
| | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 243 | Have ability to monitor radiation from X-ray machine |
| | 263 | Ability to evaluate an industrial hygiene problem |
| 1.93 | 68 | Know what the adiabatic lapse rate is |
| | 154 | Knowledge of the Fluorescent Antibody Test |
| | 157 | Knowledge of intestinal nematodes |
| | 234 | Know how to run field tests for atmospheric contamination |
| | 240 | Know acceptable disposal sites |
| | 241 | Know who is responsible for disposal of radioactive waste |
| | 255 | Understand abnormal stress due to improper work methods |
| | 301 | Know methods of disinfecting operating rooms |
| 1.91 | 11 | Ability to calculate volumes of water required at an installation |
| | 12 | Ability to calculate peak load of a water system |
| | 13 | Ability to size systems to meet load requirements |
| | 36 | Ability to size lagoons to a given system |
| | 55 | Ability to size kitchen ventilation systems |
| 1.87 | 95 | Knowledge of Volume Reductions Systems |
| | 120 | Knowledge of the Floatation Process |
| | 230 | Know what "threshold limit values" are for toxic chemicals |

TABLE IV - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.87 (Cont'd) | 231 | Understand metric system of measurements |
| | 261 | Know which agents may affect the skin |
| 1.86 | 169 | Understand recirculation systems |
| 1.83 | 19 | Know how to run a "yield and drawdown" test |
| 1.80 | 158 | Knowledge of Cestodes and Trematodes |
| | 254 | Understand physiological distress due to agents in industrial atmosphere |
| 1.73 | 45 | Ability to recognize sex of animals and fowl |
| | 88 | Ability to evaluate compaction equipment |
| | 107 | Knowledge of acoustical or sound-absorbing walls |
| 1.67 | 89 | Ability to calculate volumes of refuse and cover material |
| | 122 | Knowledge of removing fluorides from water |
| 1.64 | 46 | Ability to estimate approximate age of fowl |
| 1.60 | 92 | Estimate net weight on folume of loads |
| | 94 | Knowledge of Systems Analysis Concept |
| 1.53 | 172 | Know requirements of safety equipment |
| 1.47 | 79 | Know several deleterious effects of air pollution other than health effects |
| | 90 | Ability to route pickup crews |
| 1.27 | 91 | Know maintenance procedures on equipment |

This population sub-group places 38 survey items in the CNF category of 2.80 or above. Of these 38 items, this sub-group was unanimous in its opinion (CNF's of 3.00) regarding the importance of six competency needs. The six items are: public relations (#2), dependable work habits (#5), the ability to sample water supplies (#24), knowledge of the public health hazards of contaminated water systems (#27), knowledge of the public health hazards of waste disposal system failure (#40), and the competency to differentiate between sanitary and unsanitary conditions (#43).

The Iowa department administrators place 50 items or 16% of the questions below a CNF of 2.00. Therefore, the reader may wish to question the advisability of including these items in a curriculum for a sanitarian aide.

Table V presents the figures accumulated from the 126 questionnaires received from the respondents in the Iowa sanitarians population sub-group.

TABLE V

COMPETENCY NEED FACTORS IN DESCENDING ORDER OF IMPORTANCE BY IOWA SANITARIANS

| CNF | Item No. | Item Description |
|---|---|---|
| 2.94 | 43 | Ability to differentiate between sanitary and unsanitary conditions |
| 2.92 | 41 | Ability to recognize public health aspects of a nuisance |
| 2.90 | 4 | Good personal hygiene |
| | 27 | Know the public health hazards of a contaminated system |
| | 40 | Know the public health hazards of waste disposal system failure |
| | 53 | Ability to inspect eating and drinking establishments under applicable codes |
| | 64 | Recognize safe and unsafe food handling procedures |
| 2.89 | 2 | Ability with public relations and with public |
| | 33 | Ability to inspect existing systems |
| | 34 | Ability to recognize acceptable installation |
| 2.88 | 24 | Ability to sample water supplies |
| | 60 | Understand control of pests in food service establishments |
| | 62 | Understand the control of pathogenic organisms in food service establishments |
| | 63 | Recognize acceptable refrigeration facilities |
| | 65 | Recognize good personal hygiene |
| 2.86 | 5 | Dependable work habits |
| | 57 | Recognize acceptable single service utensils |
| | 124 | Knowledge of the types of chemicals used for emergency chlorination |
| 2.84 | 39 | Ability to recognize system failure |
| | 54 | Ability to recognize cross connections in plumbing |
| | 56 | Understand sanitization of multi-use utensils |
| 2.83 | 14 | Ability to recognize need of disinfection |
| | 86 | Understand the significance and control of leachate |
| 2.82 | 1 | Knowledge of codes, laws, rules and regulations pertaining to work |
| 2.80 | 3 | Ability to write meaningful and intelligent reports |
| | 171 | Ability to run field tests for chlorine and pH |
| 2.79 | 17 | Ability to recognize cross connections |
| 2.78 | 20 | Know how to disinfect a water source and system |
| 2.77 | 18 | Know the sanitary precautions for each type of well |
| | 85 | Know how to control blow paper |
| | 87 | Know proper compaction and cover procedures |
| 2.76 | 61 | Recognize hazardous chemicals and know their uses |
| 2.75 | 10 | Ability to cooperate and work with other departments and agencies |
| | 23 | Know the possible routes of contamination in each type of well |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.74 | 138 | Recognize cross connections between water and sewage systems |
| | 163 | Ability to take legal swimming pool water samples |
| 2.73 | 22 | Ability to inspect and recognize each type of well construction |
| 2.72 | 47 | Know the procedures in processing citizen-initiated complaints |
| | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| | 210 | Ability to recognize rodent harborages |
| 2.71 | 29 | Ability to accomplish percolation tests |
| 2.70 | 59 | Ability to evaluate cleanliness of vending machines |
| 2.69 | 15 | Ability to run field test for disinfectant residual |
| | 133 | Recognize health hazards at summer camps |
| | 135 | Understand vector control in camps |
| | 191 | Ability to recognize acceptable toilet facilities |
| 2.67 | 16 | Ability to recognize different types of wells |
| | 26 | Know the procedure to seal an abandoned well |
| | 276 | Ability to recognize mosquito breeding areas |
| 2.65 | 7 | Understand methods of gathering and preserving evidence |
| | 165 | Understand relationship of pH to chlorine |
| 2.64 | 205 | Know accepted safegards for various poisons |
| 2.63 | 28 | Know and have the ability to apply standards to privies |
| | 146 | Know the mode of transmission of vector-borne diseases |
| | 178 | Know bacterial and chemical standards for both raw and pasteurized milk |
| 2.62 | 128 | Ability to sample chlorinated water |
| | 283 | Know proper procedures in a human rabies exposure |
| 2.61 | 6 | Knowledge of the professional jargon of the discipline |
| 2.60 | 8 | Knowledge of enforcement procedures |
| 2.59 | 211 | Know standards for storing materials to deter rodents |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 252 | Know good housekeeping practices |
| 2.58 | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| 2.57 | 25 | Ability to interpret water supply analysis reports |
| | 30 | Know the relationship between soil types and effluent absorption |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 186 | Know the significance of coliform bacteria in pasteurized milk |
| 2.56 | 207 | Know effective rat proofing methods |
| | 267 | Know insects of public health importance |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.56 (Cont'd) | 273 | Know materials in which flies will lay eggs |
| | 274 | Know sanitary storage methods of insect breeding materials |
| | 275 | Know mosquito control methods |
| 2.55 | 164 | Understand algae control |
| 2.54 | 130 | Understand and apply standards for semi-public water and sewage systems |
| | 167 | Know diseases usually associated with natural bathing places |
| | 173 | Understand use of chlorine, alum and soda ash |
| | 193 | Ability to recognize acceptable bathing facilities |
| | 293 | Know how to get samples in safe, legal manner |
| | 296 | Ability to recognize unclean conditions by sight and smell |
| 2.53 | 51 | Understand the S.N.F. standards relative to food service equipment |
| 2.52 | 38 | Know lagoon maintenance requirements |
| | 49 | Know proper use of herbicides and pesticides in nuisance control |
| 2.51 | 96 | Knowledge of vector control |
| | 168 | Understand bacterial standards and their application |
| | 190 | Ability to recognize acceptable kitchen facilities |
| | 203 | Know rat proofing methods |
| | 209 | Know house mouse control methods |
| | 266 | Know major disease spread to man by insect |
| 2.49 | 32 | Ability to design and size systems to fit existing conditions |
| | 37 | Know lagoon safety requirements |
| | 119 | Knowledge of techniques used to treat water |
| | 142 | Understand and be able to explain use of pesticides in camps |
| | 170 | Ability to interpret analysis results |
| | 194 | Understand the definitions in the State Housing Code |
| | 195 | Know the responsibilities of owners of dwelling |
| | 196 | Know the responsibilities of occupants of dwelling |
| | 208 | Know diseases spread by rodents to man |
| | 269 | Know proper use of insecticides |
| | 277 | Understand water ponding control as a mosquito control tool |
| | 287 | Ability to cooperate with Humane Society |
| | 294 | Know modes of transmission for salmonella from pets to human |
| 2.46 | 99 | Understand community-wide solid waste control methods |
| | 152 | Understand the difference between aerobic and anaerobic bacteria |
| | 169 | Understand recirculation systems |
| | 215 | Know how various diseases are transmitted from rodents to man |
| | 253 | Understand occupational diseases caused by harmful situations |
| | 262 | Know which state department is responsible in case of an industrial accident |
| | 271 | Understand vector-borne disease transmission |
| | 289 | Know how to handle a rabid animal |
| | 305 | Know when air gaps are required on plumbing fixtures |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.44 | 9 | Ability to be a court witness |
| | 35 | Know the basis of lagoon operation |
| | 200 | Know meaning of deteriorated and dilapidated |
| | 225 | Know where protective clothing must be worn |
| | 258 | Recognize conditions causing disabilities and accidents |
| | 279 | Know naturalistic mosquito abatement methods |
| | 285 | Know evidence of lack of sanitary manure storage |
| 2.43 | 93 | Know sanitary landfill standards |
| | 147 | Understand definitions of epidemic, endemic, pandemic, sylvan and urban |
| | 160 | Know the maining of "High-free Residual Chlorine" |
| 2.41 | 272 | Know intermediate hosts of insects of public health importance |
| | 295 | Know the route of infection transmission in nursing homes |
| 2.40 | 31 | Ability to read sanitary plot maps and simple blueprints |
| | 114 | Know the level of decibels that causes come permanent hearing loss |
| | 117 | Know the functions of a reservoir |
| | 123 | Ability to do a sanitary survey of water supply |
| | 132 | Ability to apply sanitary standards to migratory labor camps |
| | 145 | Know the reservoir of communicable disease endemic to the area |
| | 172 | Know requirements of safety equipment |
| | 181 | Ability to take legal milk samples |
| 2.38 | 192 | Ability to recognize acceptable sleeping facilities |
| | 198 | Know plumbing fixtures required in dwellings |
| | 206 | Ability to recognize Norway Rat and Roof Rat |
| | 212 | Ability to recognize restricted substances by name |
| | 221 | Know what decibel range hearing loss starts |
| 2.37 | 66 | Be able to define air pollution |
| | 126 | Knowledge of the Zone of Aeration |
| 2.36 | 199 | Know regulations relative to handrails on steps |
| | 218 | Know necessity of rat watering points |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| | 282 | Know legal procedure to enforce local animal control code |
| 2.35 | 219 | Understand fumigant methods |
| 2.34 | 134 | Know how to calculate the volume of water required per person |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| | 188 | Know farm storage milk temperature requirements |
| 2.33 | 197 | Ability to recognize adequate heating facilities |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 250 | Ability to run carbon monoxide field test |
| | 260 | Know which agents may cause respiratory disease |
| 2.32 | 50 | Ability to recognize all stages of life cycles of disease vectors |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.31 | 98 | Know refuse control measure at camps and transient lodging facilities |
| | 185 | Understand relationship of cow herd health and human disease transmission |
| | 202 | Know toxic paint and toxic preservative materials |
| | 226 | Know when safety equipment must be readily available |
| | 229 | Know where eating and smoking areas are located in a plant |
| | 257 | Recognize agents causing disabilities |
| | 259 | Know what safety devices are needed in a given situation |
| | 261 | Know which agents may affect the skin |
| | 268 | Know life cycles of insects of public health importance |
| | 299 | Know proper use of pesticides in all types of institutions |
| 2.29 | 81 | Understand air pollution warnings, alerts and emergencies |
| | 137 | Ability to recognize adequate laundry facilities in migrant labor camps |
| 2.28 | 72 | Name the six pollutants specified in the Clean Air Act |
| | 150 | Understand the transmission of zoonosis |
| | 159 | Know the term "Thermal Death Time" |
| | 201 | Know window and skylight and/or artificial light required |
| | 214 | Know tracking powders and how to use them |
| | 222 | Know the definition of noise |
| | 297 | Know illumination standards for institutional kitchens |
| | 304 | Know proper handling methods of soiled mops |
| | 306 | Know sanitary methods of disposal of dressings and laboratory cultures |
| 2.26 | 141 | Understand fire regulations and standards |
| | 144 | Recognize type and application of fire extinguishers |
| | 151 | Understand reproduction and physiology of bacteria |
| | 162 | Know cause of mud ball in filters |
| | 166 | Know recommended depth of diving area to height of diving board |
| | 235 | Understand radiation exposure |
| 2.25 | 84 | Knowledge of acceptable roads within the landfill |
| | 97 | Knowledge of sanitation at a transfer station |
| | 100 | Understand definition of noise as compared to sound |
| | 102 | Ability to define decibels |
| 2.24 | 21 | Understand spring development as a domestic water source |
| | 44 | Know areas of a community which exclude specific classes of animals by zoning |
| | 116 | Ability to take legal water samples |
| 2.23 | 71 | Name five major sources of air pollution |
| | 74 | Know three respiratory diseases that tend to be aggravated by air pollution |
| | 148 | Understand the relationship between wild animal population and rabies |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| | 189 | Know required contact times and strengths of various disinfectants |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.23 (Cont'd) | 204 | Know density and space requirements |
| | 213 | Ability to estimate size of rodent population |
| | 216 | Ability to estimate age of rodent signs |
| | 223 | Understand occupational causes of hearing loss |
| | 224 | Know relationship between duration of noise exposure and decibel level |
| | 239 | Understand hazards of continuous X-ray exposure |
| | 248 | Know what to do in case of a radioactive spill |
| | 254 | Understand physiological distress due to agents in industrial atmosphere |
| | 255 | Understand abnormal stress due to improper work methods |
| | 264 | Have completed Red Cross First Aid Training |
| | 284 | Know local requirements for restrictions of numbers of animals |
| | 307 | Know cleaning methods of refuse chutes and dumbwaiters |
| | 308 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| 2.22 | 69 | Know what a temperature inversion is |
| | 82 | Knowledge of soils |
| | 139 | Know ratio of plumbing-fixtures-to-population of day camps |
| 2.21 | 302 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| | 303 | Understand proper location of air intake and exhaust systems |
| 2.20 | 73 | Know the local ambient air quality standards for each of the six pollutants |
| | 101 | Understand undesirable hearing changes as result of noise levels |
| | 111 | Understand noise abatement methods |
| | 127 | Understand quality control methods in water treatment plants |
| | 140 | Know space requirements for outdoor campsites |
| | 143 | Ability to recognize fire safety hazards in motels and hotels |
| | 184 | Understand mastitis control |
| 2.18 | 48 | Ability to recognize noxious weeds |
| | 217 | Know how to mix rodent baits |
| | 256 | Ability to work with plant safety officer |
| | 263 | Ability to evaluate an industrial hygiene problem |
| | 270 | Know how to calculate ppm and mix insecticides |
| | 278 | Know the flight range of various mosquitos |
| | 309 | Understand soiled laundry handling problems in institutions |
| 2.17 | 110 | Understand noise prevention methods |
| | 113 | Know acceptable standards of noise levels for homes and industry |
| | 120 | Knowledge of the Floatation Process |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| | 155 | Knowledge of active and passive immunity |
| | 156 | Know the general effects of light on bacteria |
| | 187 | Know the significance of phosphatase in pasteurized milk |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.15 | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 241 | Know who is responsible for disposal of radioactive waste |
| | 247 | Understand "half life" of an isotope |
| | 249 | Understand use of protective clothing and devices |
| | 281 | Know wild host animal of zoonosis in your area |
| | 292 | Know epidemiological procedures for zoonosis |
| 2.14 | 75 | Be able to name three air pollution control devices |
| | 78 | Know the various means used to monitor air pollution |
| | 106 | Know what an ondimeter is |
| | 109 | Know principal sources of community noises |
| | 115 | Know the potential ways for increasing the usable water supply |
| | 131 | Understand standards of floor space and cubic air space for occupancy |
| 2.13 | 220 | Know where IOSHA Laws apply and where local department has responsibility |
| | 230 | Know what "threshold limit values" are for toxic chemicals |
| | 242 | Know effect of radiation on living tissue |
| | 265 | Understand use of keys in insect identification |
| 2.11 | 79 | Know several deleterious effects of air pollution other than health effects |
| | 121 | Knowledge of the Continuous Regeneration Process |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| 2.10 | 232 | Know significance of oral, dermal, and inhalation exposure |
| | 233 | Know what protective clothing is required in dusty conditions |
| | 246 | Understand the term: Electron, Proton, Neutron |
| | 280 | Know zoonosis indigenous to wild life of your area |
| | 298 | Know water volume per bed and temperature standards for nursing homes |
| 2.09 | 108 | Knowledge of value of sound muffs |
| 2.08 | 227 | Understand relationship between accident rate and housekeeping |
| | 236 | Ability to use dosimeter and Gieger counter |
| | 240 | Know acceptable disposal sites |
| | 243 | Have ability to monitor radiation from X-ray machine |
| | 288 | Know sanitary requirements for stockyards |
| 2.06 | 11 | Ability to calculate volumes of water required at an installation |
| | 12 | Ability to calculate peak load of a water system |
| | 36 | Ability to size lagoons to a given system |
| | 157 | Knowledge of intestinal nematodes |
| | 158 | Knowledge of Cestodes and Trematodes |
| | 174 | Be able to calculate and maneuver bathing load |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.05 | 122 | Knowledge of removing fluorides from water |
| | 234 | Know how to run field tests for atmospheric contamination |
| | 286 | Understand acceptable animal feed storage |
| | 300 | Know and apply occupancy standards to all types of insititutions |
| 2.03 | 175 | Know how to check a leak protector valve |
| 2.02 | 55 | Ability to size kitchen ventilation systems |
| 2.00 | 70 | Know the effects of meteorology and topography on air pollution |
| | 77 | Know the Ringelmann System of defining visible air pollutants |
| | 104 | Knowledge of pressure level of noise |
| | 112 | Understand application of sound proofing buildings and offices |
| | 183 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| | 244 | Know fission from fusion |
| 1.98 | 13 | Ability to size systems to meet load requirements |
| | 58 | Ability to evaluate location of vending machines |
| 1.97 | 67 | Know the primary gaseous components in the atmosphere |
| | 107 | Knowledge of acoustical or sound-absorbing walls |
| | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| 1.95 | 231 | Understand metric system of measurements |
| | 301 | Know methods of disinfecting operating rooms |
| 1.94 | 68 | Know what the adiabatic lapse rate is |
| | 80 | Understand the relationship between air pollutants and allergies |
| | 89 | Ability to calculate volumes of refuse and cover material |
| | 103 | Ability to define frequencies in cycles per second |
| | 154 | Knowledge of the Fluorescent Antibody Test |
| | 161 | Ability to read and evaluate a flow diagram |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| 1.92 | 19 | Know how to run a "yield and drawdown" test |
| 1.91 | 118 | Know how to study the flood characteristics of a stream |
| | 125 | Ability to define "potable water" |
| | 182 | Understand application of the "holding tube" |
| 1.90 | 237 | Understand isotopic forms of elements |
| 1.89 | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| 1.86 | 176 | Know how to operate a HTST flow diversion valve |
| 1.85 | 291 | Know psittacosis control procedures |
| 1.74 | 92 | Estimate net weight on volume of loads |
| | 95 | Knowledge of Volume Reductions Systems |

TABLE V - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.69 | 88 | Ability to evaluate compaction equipment |
| | 180 | Know how to calculate logarithmic average of bacterial counts |
| 1.68 | 94 | Knowledge of a Systems Analysis Concept |
| 1.66 | 105 | Knowledge of frequency of noise |
| 1.46 | 45 | Ability to recognize sex of animals and fowl |
| | 90 | Ability to route pickup crews |
| 1.40 | 83 | Ability to operate landfill equipment |
| 1.34 | 46 | Ability to estimate approximate age of fowl |
| | 91 | Know maintenance procedures on equipment |

The professional sanitarians in Iowa scored 26 items in a category above a CNF of 2.79 in importance. They indicated that 36 items in the survey were of little importance. These 36 items were rated a CNF of below 2.00. The least important as indicated by this sub-group are: Knowledge of sanitary landfill equipment maintenance procedures (#91), ability to estimate the age of fowl (#46), have the ability to operate landfill equipment (#83), ability to route refuse pickup crews (#90), ability to recognize the sex of animals and fowl (#45), plus 26 others. This is 10% of the questions on the survey instruments the Iowa sanitarians placed in a very low category of desirability.

The resultant data received from Nebraska health administrators is presented in Table VI as follows. A total of 46 questionnaires were received from the health administrators in Nebraska.

TABLE VI

COMPETENCY NEED FACTORS IN DESCENDING ORDER
OF IMPORTANCE BY NEBRASKA HEALTH ADMINISTRATORS

| CNF | Item No. | Item Description |
|---|---|---|
| 2.95 | 43 | Ability to differentiate between sanitary and unsanitary conditions |
| 2.92 | 269 | Know proper use of insecticides |
| 2.90 | 4 | Good personal hygiene |
| 2.85 | 210 | Ability to recognize rodent harborages |
| | 211 | Know standards for storing materials to deter rodents |
| | 267 | Know insects of public health importance |
| 2.83 | 116 | Ability to take legal water samples |
| | 128 | Ability to sample chlorinated water |
| | 163 | Ability to take legal swimming pool water samples |
| | 171 | Ability to run field tests for chlorine and pH |
| 2.81 | 65 | Recognize good personal hygiene |
| 2.80 | 1 | Knowledge of codes, laws, rules and regulations pertaining to work |
| | 24 | Ability to sample water supplies |
| 2.77 | 203 | Know rat proofing methods |
| | 205 | Know accepted safeguards for various poisons |
| | 207 | Know effective rat proofing methods |
| | 209 | Know house mouse control methods |
| | 252 | Know good housekeeping practices |
| | 285 | Know evidence of lack of sanitary manure storage |
| | 296 | Ability to recognize unclean conditions by sight and smell |
| 2.76 | 2 | Ability with public relations and with public |
| | 5 | Dependable work habits |
| | 14 | Ability to recognize need of disinfection |
| | 23 | Know the possible routes of contamination in each type of well |
| | 40 | Know the public health hazards of waste disposal system failure |
| | 41 | Ability to recognize public health aspects of a nuisance |
| | 56 | Understand sanitization of multi-use utensils |
| | 57 | Recognize acceptable single service utensils |
| | 60 | Understand control of pests in food service establishments |
| 2.75 | 87 | Know proper compaction and cover procedures |
| | 93 | Know sanitary landfill standards |
| | 96 | Knowledge of vector control |
| | 124 | Knowledge of the types of chemicals used for emergency chlorination |
| | 133 | Recognize health hazards at summer camps |
| | 172 | Know requirements of safety equipment |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.71 | 16 | Ability to recognize different types of wells |
| | 27 | Know the public health hazards of a contaminated system |
| | 64 | Recognize safe and unsafe food handling procedures |
| 2.69 | 191 | Ability to recognize acceptable toilet facilities |
| | 217 | Know how to mix rodent baits |
| | 226 | Know when safety equipment must be readily available |
| | 273 | Know materials in which flies will lay eggs |
| | 289 | Know how to handle a rabid animal |
| | 293 | Know how to get samples in safe, legal manner |
| 2.67 | 98 | Know refuse control measure at camps and transient lodging facilities |
| | 146 | Know the mode of transmission of vector-borne diseases |
| | 162 | Know cause of mud ball in filters |
| | 173 | Understand use of chlorine, alum and soda ash |
| 2.66 | 3 | Ability to write meaningful and intelligent reports |
| | 34 | Know the basis of lagoon operation |
| | 47 | Know the procedures in processing citizen-initiated complaints |
| | 53 | Ability to inspect eating and drinking establishments under applicable codes |
| 2.65 | 10 | Ability to cooperate and work with other departments and agencies |
| 2.62 | 7 | Understand methods of gathering and preserving evidence |
| | 17 | Ability to recognize cross connections |
| | 22 | Ability to inspect and recognize each type of well construction |
| | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| | 54 | Ability to recognize cross connections in plumbing |
| | 262 | Know which state department is responsible in case of an industrial accident |
| | 266 | Know major disease spread to man by insect |
| | 274 | Know sanitary storage methods of insect breeding materials |
| | 276 | Ability to recognize mosquito breeding areas |
| | 283 | Know proper procedures in a human rabies exposure |
| 2.61 | 190 | Ability to recognize acceptable kitchen facilities |
| 2.59 | 230 | Know what "threshold limit values" are for toxic chemicals |
| 2.58 | 85 | Know how to control blow paper |
| | 99 | Understand community-wide solid waste control methods |
| | 125 | Ability to define "potable water" |
| | 135 | Understand vector control in camps |
| | 138 | Recognize cross connections between water and sewage systems |
| | 140 | Know space requirements for outdoor campsites |
| | 142 | Understand and be able to explain use of pesticides in camps |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.58 | 186 | Know the significance of coliform bacteria in pasteurized milk |
| 2.57 | 18 | Know the sanitary precautions for each type of well |
| | 55 | Ability to size kitchen ventilation systems |
| | 59 | Ability to evaluate cleanliness of vending machines |
| | 62 | Understand the control of pathogenic organisms in food service establishments |
| | 63 | Recognize acceptable refrigeration facilities |
| 2.54 | 192 | Ability to recognize acceptable sleeping facilities |
| | 193 | Ability to recognize acceptable bathing facilities |
| | 218 | Know necessity of rat watering points |
| | 224 | Know relationship between duration of noise exposure and decibel level |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 272 | Know intermediate hosts of insects of public health importance |
| | 275 | Know mosquito control methods |
| | 299 | Know proper use of pesticides in all types of institutions |
| | 306 | Know sanitary methods of disposal of dressings and laboratory cultures |
| 2.52 | 15 | Ability to run field test for disinfectant residual |
| | 33 | Ability to inspect existing systems |
| | 39 | Ability to recognize system failure |
| | 61 | Recognize hazardous chemicals and know their uses |
| 2.51 | 44 | Know areas of a community which exclude specific classes of animals by zoning |
| 2.50 | 119 | Knowledge of techniques used to treat water |
| | 143 | Ability to recognize fire safety hazards in motels and hotels |
| | 145 | Know the reservoir of communicable disease endemic to the area |
| | 160 | Know the meaning of "High-free Residual Chlorine" |
| | 182 | Understand application of the "holding tube" |
| 2.48 | 49 | Know proper use of herbicides and pesticides in nuisance control |
| 2.46 | 220 | Know where IOSHA Laws apply and where local department has responsibility |
| | 225 | Know where protective clothing must be worn |
| | 233 | Know what protective clothing is required in dusty conditions |
| | 249 | Understand use of protective clothing and devices |
| | 268 | Know life cycles of insects of public health importance |
| | 279 | Know naturalistic mosquito abatement methods |
| | 284 | Know local requirements for restrictions of numbers of animals |
| | 286 | Understand acceptable animal feed storage |
| | 294 | Know modes of transmission for salmonella from pets to human |
| | 295 | Know the route of infection transmission in nursing homes |
| | 304 | Know proper handling methods of soiled mops |
| | 305 | Know when air gaps are required on plumbing fixtures |
| | 307 | Know cleaning methods of refuse chutes and dumbwaiters |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.43 | 8 | Knowledge of enforcement procedures |
| | 9 | Ability to be a court witness |
| | 20 | Know how to disinfect a water source and system |
| 2.42 | 71 | Name five major sources of air pollution |
| | 78 | Know the various means used to monitor air pollution |
| | 81 | Understand air pollution warnings, alerts and emergencies |
| | 97 | Knowledge of sanitation at a transfer station |
| | 110 | Understand noise prevention methods |
| | 123 | Ability to do a sanitary survey of water supply |
| | 144 | Recognize type and application of fire extinguishers |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| | 164 | Understand algae control |
| | 175 | Know how to check a leak protector valve |
| | 176 | Know how to operate a HTST flow diversion valve |
| | 178 | Know bacterial and chemical standards for both raw and pasteurized milk |
| 2.38 | 194 | Understand the definitions in the State Housing Code |
| | 195 | Know the responsibilities of owners of dwelling |
| | 196 | Know the responsibilities of occupants of dwelling |
| | 208 | Know diseases spread by rodents to man |
| | 212 | Ability to recognize restricted substances by name |
| | 213 | Ability to estimate size of rodent population |
| | 214 | Know tracking powders and how to use them |
| | 222 | Know the definition of noise |
| | 229 | Know where eating and smoking areas are located in a plant |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| | 248 | Know what to do in case of a radioactive spill |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 256 | Ability to work with plant safety officer |
| 2.36 | 51 | Understand the S.N.F. standards relative to food service equipment |
| 2.34 | 6 | Knowledge of the professional jargon of the discipline |
| | 28 | Know and have the ability to apply standards to privies |
| | 35 | Know the basis of lagoon operation |
| | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| | 66 | Be able to define air pollution |
| | 74 | Know three respiratory diseases that tend to be aggravated by air pollution |
| | 82 | Knowledge of soils |
| | 100 | Understand definition of noise as compared to sound |
| | 117 | Know the functions of a reservoir |
| | 132 | Ability to apply sanitary standards to migratory labor camps |
| | 141 | Understand fire regulations and standards |
| | 155 | Knowledge of active and passive immunity |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.34 (Cont'd) | 167 | Know diseases usually associated with natural bathing places |
| | 168 | Understand bacterial standards and their application |
| | 169 | Understand recirculation systems |
| | 170 | Ability to interpret analysis results |
| | 183 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| 2.31 | 199 | Know regulations relative to handrails on steps |
| | 200 | Know meaning of deteriorated and dilapidated |
| | 202 | Know toxic paint and toxic preservative materials |
| | 204 | Know density and space requirements |
| | 215 | Know how various diseases are transmitted from rodents to man |
| | 216 | Ability to estimate age of rodent signs |
| | 219 | Understand fumigant methods |
| | 231 | Understand metric system of measurements |
| | 232 | Know significance of oral, dermal, and inhalation exposure |
| | 234 | Know how to run field tests for atmospheric contamination |
| | 250 | Ability to run carbon monoxide field test |
| | 257 | Recognize agents causing disabilities |
| | 258 | Recognize conditions causing disabilities and accidents |
| | 308 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| | 309 | Understand soiled laundry handling problems in institutions |
| 2.30 | 206 | Ability to recognize Norway Rat and Roof Rat |
| | 227 | Understand relationship between accident rate and housekeeping |
| 2.28 | 26 | Know the procedure to seal an abandoned well |
| | 37 | Know lagoon safety requirements |
| 2.25 | 69 | Know what a temperature inversion is |
| | 75 | Be able to name three air pollution control devices |
| | 113 | Know acceptable standards of noise levels for homes and industry |
| | 114 | Know the level of decibels that causes come permanent hearing loss |
| | 120 | Knowledge of the Floatation Process |
| | 121 | Knowledge of the Continuous Regeneration Process |
| | 131 | Understand standards of floor space and cubic air space for occupancy |
| | 134 | Know how to calculate the volume of water required per person |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| | 147 | Understand definitions of epidemic, endemic, pandemic, sylvan and urban |
| | 151 | Understand reproduction and physiology of bacteria |
| | 156 | Know the general effects of light on bacteria. |
| | 185 | Understand relationship of cow herd health and human disease transmission |
| 2.23 | 198 | Know plumbing fixtures required in dwellings |
| | 221 | Know what decibel range hearing loss starts |
| | 239 | Understand hazards of continuous X-ray exposure |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.23 (Cont'd) | 265 | Understand use of keys in insect identification |
| 2.19 | 29 | Ability to accomplish percolation tests |
| | 50 | Ability to recognize all stages of life cycles of disease vectors |
| 2.17 | 70 | Know the effects of meteorology and topography on air pollution |
| | 72 | Name the six pollutants specified in the Clean Air Act |
| | 79 | Know several deleterious effects of air pollution other than health effects |
| | 109 | Know principal sources of community noises |
| | 111 | Understand noise abatement methods |
| | 115 | Know the potential ways for increasing the usable water supply |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| | 137 | Ability to recognize adequate laundry facilities in migrant labor camps |
| | 139 | Know ratio of plumbing-fixtures-to-population of day camps |
| | 148 | Understand the relationship between wild animal population and rabies |
| 2.16 | 184 | Understand mastitis control |
| | 270 | Know how to calculate ppm and mix insecticides |
| 2.15 | 201 | Know window and skylight and/or artificial light required |
| | 223 | Understand occupational causes of hearing loss |
| | 235 | Understand radiation exposure |
| | 236 | Ability to use dosimeter and Geiger counter |
| | 264 | Have completed Red Cross First Aid Training |
| | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| | 298 | Know water volume per bed and temperature standards for nursing homes |
| | 301 | Know methods of disinfecting operating rooms |
| | 303 | Understand proper location of air intake and exhaust systems |
| 2.14 | 31 | Ability to read sanitary plot maps and simple blueprints |
| | 38 | Know lagoon maintenance requirements |
| 2.09 | 25 | Ability to interpret water supply analysis reports |
| 2.08 | 77 | Know the Ringelmann System of defining visible air pollutants |
| | 86 | Understand the significance and control of leachate |
| | 89 | Ability to calculate volumes of refuse and cover material |
| | 102 | Ability to define decibels |
| | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 242 | Know effect of radiation on living tissue |
| | 253 | Understand occupational diseases caused by harmful situations |
| | 259 | Know what safety devices are needed in a given situation |
| | 261 | Know which agents may effect the skin |
| | 280 | Know zoonosis indigenous to wild life of your area |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.08 (Cont'd) | 281 | Know wild host animal of zoonosis in your area |
| | 291 | Know psittacosis control procedures |
| 2.07 | 197 | Ability to recognize adequate heating facilities |
| 2.05 | 48 | Ability to recognize noxious weeds |
| | 58 | Ability to evaluate location of vending machines |
| 2.00 | 36 | Ability to size lagoons to a given system |
| | 127 | Understand quality control methods in water treatment plants |
| | 150 | Understand the transmission of zoonosis |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 159 | Know the term "Thermal Death Time" |
| | 161 | Ability to read and evaluate a flow diagram |
| | 174 | Be able to calculate and maneuver bathing load |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| | 181 | Ability to take legal milk samples |
| | 187 | Know the significance of phosphatase in pasteurized milk |
| | 188 | Know farm storage milk temperature requirements |
| | 260 | Know which agents may cause respiratory disease |
| | 271 | Understand vector-borne disease transmission |
| | 277 | Understand water ponding control as a mosquito control tool |
| | 278 | Know the flight range of various mosquitos |
| | 282 | Know legal procedure to enforce local animal control code |
| | 287 | Ability to cooperate with Humane Society |
| | 288 | Know sanitary requirements for stockyards |
| | 297 | Know illumination standards for institutional kitchens |
| | 300 | Know and apply occupancy standards to all types of institutions |
| | 302 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| 1.95 | 30 | Know the relationship between soil types and effluent absorption |
| 1.92 | 67 | Know the primary gaseous components in the atmosphere |
| | 68 | Know what the adiabatic lapse rate is |
| | 73 | Know the local ambient air quality standards for each of the six pollutants |
| | 84 | Knowledge of acceptable roads within the landfill |
| | 88 | Ability to evaluate compaction equipment |
| | 92 | Estimate net weight on volume of loads |
| | 101 | Understand undesirable hearing changes as result of noise levels |
| | 108 | Knowledge of value of sound muffs |
| | 126 | Knowledge of the Zone of Aeration |
| | 152 | Understand the difference between aerobic and anaerobic bacteria |
| | 157 | Knowledge of intestinal nematodes |
| | 165 | Understand relationship of pH to chlorine |
| | 166 | Know recommended depth of diving area to height of diving board |

TABLE VI - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.92 (Cont'd) | 189 | Know required contact times and strengths of various disinfectants |
| 1.90 | 21 | Understand spring development as a domestic water source |
| | 32 | Ability to design and size systems to fit existing conditions |
| 1.85 | 241 | Know who is responsible for disposal of radioactive waste |
| | 243 | Have ability to monitor radiation from X-ray machine |
| | 246 | Understand the term: Electron, Proton, Neutron |
| | 247 | Understand "half life" of an isotope |
| | 263 | Ability to evaluate an industrial hygiene problem |
| | 292 | Know epidemiological procedures for zoonosis |
| 1.83 | 104 | Knowledge of pressure level of noise |
| | 105 | Knowledge of frequency of noise |
| | 106 | Know what an ondimeter is |
| | 112 | Understand application of sound proofing buildings and offices |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| 1.81 | 11 | Ability to calculate volumes of water required at an installation |
| 1.80 | 19 | Know how to run a "yield and drawdown" test |
| 1.77 | 244 | Know fission from fusion |
| | 254 | Understand physiological distress due to agents in industrial atmosphere |
| | 255 | Understand abnormal stress due to improper work methods |
| 1.75 | 80 | Understand the relationship between air pollutants and allergies |
| | 90 | Ability to route pickup crews |
| | 103 | Ability to define frequencies in cycles per second |
| | 107 | Knowledge of acoustical or sound-absorbing walls |
| | 180 | Know how to calculate logarithmic average of bacterial counts |
| 1.71 | 12 | Ability to calculate peak load of a water system |
| 1.69 | 240 | Know acceptable disposal sites |
| 1.67 | 13 | Ability to size systems to meet load requirements |
| | 118 | Know how to study the flood characteristics of a stream |
| | 158 | Knowledge of Cestodes and Trematodes |
| 1.61 | 237 | Understand isotopic forms of elements |
| 1.58 | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| | 91 | Know maintenance procedures on equipment |
| | 94 | Knowledge of a Systems Analysis Concept |
| | 95 | Knowledge of Volume Reductions Systems |
| | 122 | Knowledge of removing fluorides from water |

TABLE VI - Continued

| CNF | Item No. | Item Description | CNF | Item No. | Item Description |
|---|---|---|---|---|---|
| 1.48 | 45 | Ability to recognize sex of animals and fowl | 1.33 | 46 | Ability to estimate approximate age of fowl |
| | | | | 83 | Ability to operate landfill equipment |
| 1.38 | 130 | Understand and apply standards for semi-public water and sewage systems | | 154 | Knowledge of the Fluorescent Antibody Test |

The Nebraska health department administrators as a survey population sub-group place 13 questionnaire items in the category of 2.80 or above. This is 4.2% of the questions asked on the questionaire. The highest CNF among these items is 2.95 - the ability to differentiate between sanitary and unsanitary conditions (#43), know proper use of pesticides (#269), good personal hygiene (#4), ability to recognize rodent harborages (#210), know standards for storage of materials to deter rodents (#211), know insects of public health importance (#267), ability to take legal water samples (#116), ability to sample chlorinated water (#128), ability to take legal swimming pool water samples (#163), ability to check water in the field for chlorine and pH (#170), recognize good personal hygiene (#65), knowledge of codes, laws, rules, and regulations pertaining to work (#1), and last, the ability to sample water supplies (#24).

The same population sub-group placed 14 items below the level of 2.00. This is 4.5% of the questions asked. Therefore, the Nebraska sanitarians indicate that in their opinion 4.5% of the questions on the survey instruments are not applicable to the sanitarian aides job competencies.

The data from the final sub-group of the study, the professional sanitarians in the State of Nebraska, is provided in Table VII. This population sub-group returned 59 questionnaires.

TABLE VII

COMPETENCY NEED FACTORS IN DECENDING ORDER OF IMPORTANCE BY NEBRASKA SANITARIANS

| CNF | Item No. | Item |
|---|---|---|
| 2.90 | 191 | Ability to recognize acceptable toilet facilities |
| | 211 | Know standards for storing materials to deter rodents |
| 2.85 | 78 | Know the various means used to monitor air pollution |
| | 135 | Understand vector control in camps |
| | 138 | Recognize cross connections between water and sewage systems |
| 2.83 | 41 | Ability to recognize public health aspects of a nuisance |
| | 43 | Ability to differentiate between sanitary and unsanitary conditions |
| 2.82 | 40 | Know the public health hazards of waste disposal system failure |
| 2.80 | 125 | Ability to define "potable water" |
| | 163 | Ability to take legal swimming pool water samples |
| | 190 | Ability to recognize acceptable kitchen facilities |
| | 210 | Ability to recognize rodent harborages |
| | 218 | Know necessity of rat watering points |
| | 262 | Know which state department is responsible in case of an industrial accident |
| | 276 | Ability to recognize mosquito breeding areas |
| | 293 | Know how to get samples in safe, legal manner |
| | 294 | Know modes of transmission for salmonella from pets to human |
| | 296 | Ability to recognize unclean conditions by sight and smell |
| 2.79 | 4 | Good personal hygiene |
| | 65 | Recognize good personal hygiene |
| 2.78 | 1 | Knowledge of codes, laws, rules and regulations pertaining to work |
| 2.76 | 64 | Recognize safe and unsafe food handling procedures |
| 2.75 | 14 | Ability to recognize need of disinfection |
| | 60 | Understand control of pests in food service establishments |
| | 68 | Know what the adiabatic lapse rate is |
| | 96 | Knowledge of vector control |
| | 116 | Ability to take legal water samples |
| | 128 | Ability to sample chlorinated water |
| | 181 | Ability to take legal milk samples |
| 2.72 | 2 | Ability with public relations and with public |
| | 5 | Dependable work habits |
| | 62 | Understand organisms in food service establishments |
| 2.71 | 20 | Know how to disinfect a water source and system |
| 2.70 | 27 | Know the public health hazards of a contaminated system |
| | 75 | Be able to name three air pollution control devices |
| | 93 | Know sanitary landfill standards |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.70 (Cont'd) | 124 | Knowledge of the types of chemicals used for emergency chlorination |
| | 153 | Understand pasteurization, sanitation, and sterilization |
| | 193 | Ability to recognize acceptable bathing facilities |
| | 194 | Understand the definitions in the State Housing Code |
| | 205 | Know accepted safeguards for various poisons |
| | 225 | Know where protective clothing must be worn |
| | 245 | Ability to cooperate with Civil Defense Department in catastrophe |
| | 249 | Understand use of protective clothing and devices |
| | 252 | Know good housekeeping practices |
| | 271 | Understand vector-borne disease transmission |
| | 273 | Know materials in which flies will lay eggs |
| | 283 | Know proper procedures in a human rabies exposure |
| | 305 | Know when air gaps are required on plumbing fixtures |
| 2.68 | 24 | Ability to sample water supplies |
| | 53 | Ability to inspect eating and drinking establishments under applicable codes |
| | 54 | Ability to recognize cross connections in plumbing |
| | 56 | Understand sanitization of multi-use utensils |
| 2.67 | 17 | Ability to recognize cross connections |
| 2.65 | 61 | Recognize hazardous chemicals and know their uses |
| | 188 | Know farm storage milk temperature requirements |
| 2.64 | 18 | Know the sanitary precautions for each type of well |
| | 33 | Ability to inspect existing systems |
| 2.62 | 7 | Understand methods of gathering and preserving evidence |
| | 47 | Know the procedures in processing citizen-initiated complaints |
| | 63 | Recognize acceptable refrigeration facilities |
| 2.60 | 87 | Know proper compaction and cover procedures |
| | 119 | Knowledge of techniques used to treat water |
| | 149 | Understand dog and cat control ordinances used in human rabies cases |
| | 160 | Know the meaning of "High-free Residual Chlorine" |
| | 165 | Understand relationship of pH to chlorine |
| | 171 | Ability to run field test for chlorine and pH |
| | 192 | Ability to recognize acceptable sleeping facilities |
| | 197 | Ability to recognize adequate heating facilities |
| | 198 | Know plumbing fixtures required in dwellings |
| | 200 | Know meaning of deteriorated and dilapidated |
| | 201 | Know window and skylight and/or artificial light required |
| | 207 | Know effective rat proofing methods |
| | 220 | Know where IOSHA Laws apply and where local department has responsibility |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.60 (Cont'd) | 226 | Know when safety equipment must be readily available |
| | 227 | Understand relationship between accident rate and housekeeping |
| | 236 | Ability to use dosimeter and Geiger counter |
| | 272 | Know intermediate hosts of insects of public health importance |
| | 274 | Know sanitary storage methods of insect breeding materials |
| | 275 | Know mosquito control methods |
| | 277 | Understand water ponding control as a mosquito control tool |
| | 285 | Know evidence of lack of sanitary manure storage |
| 2.58 | 59 | Ability to evaluate cleanliness of vending machines |
| 2.57 | 3 | Ability to write meaningful and intelligent reports |
| | 23 | Know the possible routes of contamination in each type of well |
| 2.55 | 57 | Recognize acceptable single service utensils |
| | 109 | Know principal sources of community noises |
| | 146 | Know the mode of transmission of vector-borne diseases |
| | 164 | Understand algae control |
| | 173 | Understand use of chlorine, alum and soda ash |
| | 186 | Know the significance of coliform bacteria in pasteurized milk |
| 2.53 | 16 | Ability to recognize different types of wells |
| | 39 | Ability to recognize system failure |
| 2.52 | 10 | Ability to cooperate and work with other departments and agencies |
| | 42 | Ability to assist pet owners in fly, rodent, and odor control |
| 2.50 | 34 | Ability to recognize acceptable installation |
| | 99 | Understand community-wide solid waste control methods |
| | 110 | Understand noise prevention methods |
| | 114 | Know the level of decibels that causes some permanent hearing loss |
| | 123 | Ability to do a sanitary survey of water supply |
| | 152 | Understand the difference between aerobic and anaerobic bacteria |
| | 172 | Know requirements of safety equipment |
| | 199 | Know regulations relative to handrails on steps |
| | 203 | Know rat proofing methods |
| | 206 | Ability to recognize Norway Rat and Roof Rat |
| | 212 | Ability to recognize restricted substances by name |
| | 235 | Understand radiation exposure |
| | 239 | Understand hazards of continuous X-ray exposure |
| | 241 | Know who is responsible for disposal of radioactive waste |
| | 269 | Know proper use of insecticides |
| | 279 | Know naturalistic mosquito abatement methods |
| | 287 | Ability to cooperate with Humane Society |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.50 (Cont'd) | 304 | Know proper handling methods of soiled mops |
| 2.48 | 51 | Understand the S.N.F. standards relative to food service equipment |
| | 52 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| 2.46 | 22 | Ability to inspect and recognize each type of well construction |
| 2.45 | 99 | Understand community-wide solid waste control methods |
| | 111 | Understand noise abatement methods |
| | 162 | Know cause of mud ball in filters |
| | 169 | Understand recirculation systems |
| | 182 | Understand application of the "holding tube" |
| 2.44 | 26 | Know the procedure to seal an abandoned well |
| 2.43 | 15 | Ability to run field test for disinfectant residual |
| 2.40 | 71 | Name five major sources of air pollution |
| | 72 | Name the six pollutants specified in the Clean Air Act |
| | 82 | Knowledge of soils |
| | 85 | Know how to control blow paper |
| | 98 | Know refuse control measure at camps and transient lodging facilities |
| | 113 | Know acceptable standards of noise levels for homes and industry |
| | 117 | Know the functions of a reservoir |
| | 121 | Knowledge of the Continuous Regeneration Process |
| | 177 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| | 185 | Understand relationship of cow herd health and human disease transmission |
| | 187 | Know the significance of phosphatase in pasteurized milk |
| | 204 | Know density and space requirements |
| | 208 | Know diseases spread by rodents to man |
| | 214 | Know tracking powders and how to use them |
| | 215 | Know how various diseases are transmitted from rodents to man |
| | 228 | Know "adequate toilet facilities" for number of employees |
| | 229 | Know where eating and smoking areas are located in a plant |
| | 232 | Know significance of oral, dermal, and inhalation exposure |
| | 238 | Know the significance of alpha, beta, and gamma exposure |
| | 246 | Understand the term: Electron, Proton, Neutron |
| | 250 | Ability to run carbon monoxide field test |
| | 251 | Ability to recognize dangerous situations in industrial plants |
| | 265 | Understand use of keys in insect identification |
| | 266 | Know major disease spread to man by insect |
| | 282 | Know legal procedure to enforce local animal control code |
| | 284 | Know local requirements for restrictions of numbers of animals |
| | 286 | Understand acceptable animal feed storage |
| | 288 | Know sanitary requirements for stockyards |
| | 292 | Know epidemiological procedures for zoonosis |
| | 295 | Know the route of infection transmission in nursing homes |
| | 297 | Know illumination standards for institutional kitchens |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 2.10 | 115 | Know the potential ways for increasing the usable water supply |
| | 219 | Understand fumigant methods |
| | 223 | Understand occupational causes of hearing loss |
| | 237 | Understand isotopic forms of elements |
| | 242 | Know effect of radiation on living tissue |
| | 244 | Know fission from fusion |
| | 263 | Ability to evaluate an industrial hygiene problem |
| | 264 | Have completed Red Cross First Aid Training |
| | 270 | Know how to calculate ppm and mix insecticides |
| | 278 | Know the flight range of various mosquitos |
| | 300 | Know and apply occupancy standards to all types of institutions |
| 2.07 | 21 | Understand spring development as a domestic water source |
| 2.05 | 73 | Know the local ambient air quality standards for each of the six pollutants |
| | 80 | Understand the relationship between air pollutants and allergies |
| | 104 | Knowledge of pressure level of noise |
| | 107 | Knowledge of acoustical or sound-absorbing walls |
| | 175 | Know how to check a leak protector valve |
| 2.03 | 58 | Ability to evaluate location of vending machines |
| 2.02 | 30 | Know the relationship between soil types and effluent absorption |
| 2.00 | 86 | Understand the significance and control of leachate |
| | 102 | Ability to define decibels |
| | 103 | Ability to define frequencies in cycles per second |
| | 106 | Know what an ondimeter is |
| | 126 | Knowledge of the Zone of Aeration |
| | 133 | Recognize health hazards at summer camps |
| | 151 | Understand reproduction and physiology of bacteria |
| | 179 | Understand use of vacuum chamber in odor and taste control |
| | 195 | Know the responsibilities of owners of dwelling |
| | 216 | Ability to estimate age of rodent signs |
| | 257 | Recognize agents causing disabilities |
| | 267 | Know insects of public health importance |
| | 280 | Know zoonosis indigenous to wild life of your area |
| 1.96 | 50 | Ability to recognize all stages of life cycles of disease vectors |
| 1.95 | 112 | Understand application of sound proofing buildings and offices |
| | 170 | Ability to interpret analysis results |
| 1.93 | 19 | Know how to run a "yield and drawdown" test |
| | 32 | Ability to design and size systems to fit existing conditions |
| 1.90 | 120 | Knowledge of the Floatation Process |
| | 136 | Understand electrical, sewage, and water hookups in public campsites |
| | 174 | Be able to calculate and maneuver bathing load |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.90 (Cont'd) | 196 | Know the responsibilities of occupants of dwelling |
| | 234 | Know how to run field tests for atmospheric contamination |
| | 254 | Understand physiological distress due to agents in industrial atmosphere |
| | 291 | Know psittacosis control procedures |
| | 301 | Know methods of disinfecting operating rooms |
| 1.85 | 89 | Ability to calculate volumes of refuse and cover material |
| | 118 | Know how to study the flood characteristics of a stream |
| | 141 | Understand fire regulations and standards |
| | 168 | Understand bacterial standards and their application |
| 1.83 | 48 | Ability to recognize noxious weeds |
| 1.80 | 108 | Knowledge of value of sound muffs |
| | 122 | Knowledge of removing fluorides from water |
| | 158 | Knowledge of Cestodes and Trematodes |
| | 261 | Know which agents may effect the skin |
| | 290 | Know T.B. and brucellosis control methods in dairy cattle |
| | 298 | Know water volume per bed and temperature standards for nursing homes |
| 1.75 | 84 | Knowledge of acceptable roads within the landfill |
| 1.70 | 76 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| | 134 | Know how to calculate the volume of water required per person |
| | 255 | Understand abnormal stress due to improper work methods |
| 1.65 | 88 | Ability to evaluate compaction equipment |
| | 95 | Knowledge of Volume Reductions Systems |
| | 157 | Knowledge of intestinal nematodes |
| | 180 | Know how to calculate logarithmic average of bacterial counts |
| 1.64 | 11 | Ability to calculate volumes of water required at an installation |
| 1.62 | 55 | Ability to size kitchen ventilation systems |
| 1.61 | 13 | Ability to size systems to meet load requirements |
| 1.60 | 36 | Ability to size lagoons to a given system |
| | 154 | Knowledge of the Fluorescent Antibody Test |
| 1.57 | 12 | Ability to calculate peak load of a water system |
| | 45 | Ability to recognize sex of animals and fowl |
| 1.55 | 90 | Ability to route pickup crews |
| | 92 | Estimate net weight on volume of loads |
| | 94 | Knowledge of a Systems Analysis Concept |
| | 129 | Knowledge of State Urban Water Supply and Sewerage Systems Act |

TABLE VII - Continued

| CNF | Item No. | Item Description |
|---|---|---|
| 1.50 | 156 | Know the general effects of light on bacteria |
| 1.32 | 46 | Ability to estimate approximate age of fowl |
| 1.30 | 178 | Know bacterial and chemical standards for both raw and pasteurized milk |
| 1.25 | 83 | Ability to operate landfill equipment |
| | 91 | Know maintenance procedures on equipment |

The most important items to the Nebraska sanitarians had a CNF of 2.90. They are items: (#191) ability to recognize acceptable toilet facilities, (#211) know standards for storage of materials to deter rodents. This survey population sub-group placed 18 or 5.8% of the competencies on the survey instruments in the category above 2.80. This same survey population sub-group gave a CNF of less than 2.00 to 48 items included in the survey. This equals 15% of the 309 questions on the survey instruments.

Table VIII provides the reader with an item-by-item CNF comparison between the total Iowa and total Nebraska populations. The left column gives the item number. The second column gives the competency need factor of each item for Iowa and the third column gives the Nebraska competency need factor. The fourth column gives a brief description of the survey item.

TABLE VIII

A SURVEY ITEM COMPARISON OF
COMPETENCY NEED FACTORS BETWEEN
THE IOWA AND NEBRASKA RESPONDENTS

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 1 | 2.82 | 2.80 | Knowledge of codes, laws, rules and regulations pertaining to work |
| 2 | 2.83 | 2.78 | Ability with public relations and with public |
| 3 | 2.68 | 2.61 | Ability to write meaningful and intelligent reports |
| 4 | 2.83 | 2.84 | Good personal hygiene |
| 5 | 2.81 | 2.74 | Dependable work habits |
| 6 | 2.55 | 2.37 | Knowledge of the professional jargon of the discipline |
| 7 | 2.63 | 2.62 | Understand methods of gathering and preserving evidence |
| 8 | 2.48 | 2.40 | Knowledge of enforcement procedures |
| 9 | 2.42 | 2.32 | Ability to be a court witness |
| 10 | 2.68 | 2.57 | Ability to cooperate and work with other departments and agencies |
| 11 | 2.05 | 1.71 | Ability to calculate volumes of water required at an installation |
| 12 | 2.02 | 1.65 | Ability to calculate peak load of a water system |
| 13 | 1.97 | 1.63 | Ability to size systems to meet load requirements |
| 14 | 2.77 | 2.76 | Ability to recognize need of disinfection |
| 15 | 2.64 | 2.47 | Ability to run field test for disinfectant residual |
| 16 | 2.68 | 2.61 | Ability to recognize different types of wells |
| 17 | 2.69 | 2.65 | Ability to recognize cross connections |
| 18 | 2.75 | 2.65 | Know the sanitary precautions for each type of well |
| 19 | 1.96 | 1.88 | Know how to run a "yield and drawdown" test |
| 20 | 1.96 | 2.59 | Know how to disinfect a water source and system |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 21 | 2.10 | 2.00 | Understand spring development as a domestic water source |
| 22 | 2.66 | 2.53 | Ability to inspect and recognize each type of well construction |
| 23 | 2.75 | 2.65 | Know the possible routes of contamination in each type of well |
| 24 | 2.82 | 2.73 | Ability to sample water supplies |
| 25 | 2.53 | 2.16 | Ability to interpret water supply anaylsis reports |
| 26 | 2.63 | 2.38 | Know the procedure to seal an abandoned well |
| 27 | 2.83 | 2.71 | Know the public health hazards of a contaminated system |
| 28 | 2.63 | 1.73 | Know and have the ability to apply standards to privies |
| 29 | 2.65 | 2.20 | Ability to accomplish percolation tests |
| 30 | 2.54 | 2.00 | Know the relationship between soil types and effluent absorption |
| 31 | 2.44 | 2.15 | Ability to read sanitary plot maps and simple blueprints |
| 32 | 2.34 | 1.92 | Ability to design and size systems to fit existing conditions |
| 33 | 2.82 | 2.59 | Ability to inspect existing systems |
| 34 | 2.85 | 2.57 | Ability to recognize acceptable installation |
| 35 | 2.45 | 2.29 | Know the basis of lagoon operation |
| 36 | 2.07 | 1.63 | Ability to size lagoons to a given system |
| 37 | 2.41 | 2.22 | Know lagoon safety requirements |
| 38 | 2.48 | 2.18 | Know lagoon maintenance requirements |
| 39 | 2.79 | 2.53 | Ability to recognize system failure |
| 40 | 2.85 | 2.84 | Know the public health hazards of waste disposal system failure |
| 41 | 2.81 | 2.80 | Ability to recognize public health aspects of a nuisance |
| 42 | 2.54 | 2.56 | Ability to assist pet owners in fly, rodent, and odor control |
| 43 | 2.88 | 2.88 | Ability to differentiate between sanitary and unsanitary conditions |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 44 | 2.24 | 2.32 | Know areas of a community which exclude specific classes of animals by zoning |
| 45 | 1.57 | 1.50 | Ability to recognize sex of animals and fowl |
| 46 | 1.42 | 1.33 | Ability to estimate approximate age of fowl |
| 47 | 2.64 | 2.64 | Know the procedures in processing citizen-initiated complaints |
| 48 | 2.12 | 1.92 | Ability to recognize noxious weeds |
| 49 | 2.44 | 2.29 | Know proper use of herbicides and pesticides in nuisance control |
| 50 | 2.19 | 2.10 | Ability to recognize all stages of life cycles of disease vectors |
| 51 | 2.54 | 2.44 | Understand the S.N.F. standards relative to food service equipment |
| 52 | 1.80 | 2.42 | Ability to run field tests on dishwashing machines and sanitizing solutions |
| 53 | 2.73 | 2.68 | Ability to inspect eating and drinking establishments under applicable codes |
| 54 | 2.63 | 2.66 | Ability to recognize cross connections in plumbing |
| 55 | 1.99 | 1.60 | Ability to size kitchen ventilation systems |
| 56 | 2.64 | 2.72 | Understand sanitization of multi-use utensils |
| 57 | 2.67 | 2.64 | Recognize acceptable single service utensils |
| 58 | 1.63 | 2.04 | Ability to evaluate location of vending machines |
| 59 | 2.58 | 2.58 | Ability to evaluate cleanliness of vending machines |
| 60 | 2.73 | 2.76 | Understand control of pests in food service establishments |
| 61 | 2.62 | 2.60 | Recognize hazardous chemicals and know their uses |
| 62 | 2.73 | 2.66 | Understand the control of pathogenic organisms in food food service establishments |
| 63 | 2.73 | 2.60 | Recognize acceptable refrigeration facilities |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 64 | 2.78 | 2.74 | Recognize safe and unsafe food handling procedures |
| 65 | 2.74 | 2.80 | Recognize good personal hygiene |
| 66 | 2.35 | 2.34 | Be able to define air pollution |
| 67 | 2.01 | 2.06 | Know the primary gaseous components in the atmosphere |
| 68 | 1.91 | 2.44 | Know what the adiabatic lapse rate is |
| 69 | 2.16 | 2.22 | Know what a temperature inversion is |
| 70 | 2.23 | 2.22 | Know the effects of meteorology and topography on air pollution |
| 71 | 2.44 | 2.41 | Name the five major sources of air pollution |
| 72 | 2.32 | 2.31 | Name the six pollutants specified in the Clean Air Act |
| 73 | 2.25 | 2.00 | Know the local ambient air quality standards for each of the six pollutants |
| 74 | 2.30 | 2.34 | Know three respiratory diseases that tend to be aggravated by air pollution |
| 75 | 2.31 | 2.53 | Be able to name three air pollution control devices |
| 76 | 1.94 | 1.66 | Be able to discuss the synergistic effect of particulate and sulfur dioxide |
| 77 | 2.11 | 2.25 | Know the Ringelmann System of defining visible air pollutants |
| 78 | 2.37 | 2.69 | Know the various means used to monitor air pollution |
| 79 | 2.21 | 2.19 | Know several deleterious effects of air pollution other than health effects |
| 80 | 2.06 | 1.94 | Understand the relationship between air pollutants and allergies |
| 81 | 2.44 | 2.34 | Understand air pollution warnings, alerts and emergencies |
| 82 | 2.29 | 2.38 | Knowledge of soils |
| 83 | 1.56 | 1.28 | Ability to operate landfill equipment |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 84 | 2.04 | 1.81 | Knowledge of acceptable roads within the landfill |
| 85 | 2.46 | 2.47 | Know how to control blow paper |
| 86 | 2.24 | 2.03 | Understand the significance and control of leachate |
| 87 | 2.54 | 2.66 | Know proper compaction and cover procedures |
| 88 | 1.95 | 1.75 | Ability to evaluate compaction equipment |
| 89 | 2.07 | 1.94 | Ability to calculate volumes of refuse and cover material |
| 90 | 1.64 | 1.63 | Ability to route pickup crews |
| 91 | 1.47 | 1.38 | Know maintenance procedures on equipment |
| 92 | 1.82 | 1.69 | Estimate net weight on volume of loads |
| 93 | 2.61 | 2.72 | Know sanitary landfill standards |
| 94 | 1.85 | 1.56 | Knowledge of a Systems Analysis Concept |
| 95 | 1.83 | 1.63 | Knowledge of Volume Reductions Systems |
| 96 | 2.44 | 2.75 | Knowledge of vector control |
| 97 | 2.38 | 2.47 | Knowledge of sanitation at a transfer station |
| 98 | 2.43 | 2.50 | Know refuse control measure at camps and transient lodging facilities |
| 99 | 2.52 | 2.50 | Understand community-wide solid waste control methods |
| 100 | 2.36 | 2.34 | Understand definition of noise as compared to sound |
| 101 | 2.17 | 2.09 | Understand undesirable hearing changes as result of noise levels |
| 102 | 2.24 | 2.38 | Ability to define decibels |
| 103 | 1.98 | 1.94 | Ability to define frequencies in cycles per second |
| 104 | 2.01 | 2.06 | Knowledge of pressure level of noise |
| 105 | 2.03 | 2.03 | Knowledge of frequency of noise |
| 106 | 2.05 | 1.94 | Know what an ondimeter is |
| 107 | 2.10 | 1.94 | Knowledge of acoustical or sound-absorbing walls |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 108 | 2.24 | 1.84 | Knowledge of value of sound muffs |
| 109 | 2.33 | 2.41 | Know principal sources of community noises |
| 110 | 2.31 | 2.49 | Understand noise prevention methods |
| 111 | 2.29 | 2.36 | Understand noise abatement methods |
| 112 | 2.12 | 1.91 | Understand application of sound proofing buildings and offices |
| 113 | 2.26 | 2.34 | Know acceptable standards of noise levels for homes and industry |
| 114 | 2.43 | 2.41 | Know the level of decibels that causes some permanent hearing loss |
| 115 | 2.29 | 2.13 | Know the potential ways for increasing the usable water supply |
| 116 | 2.79 | 2.78 | Ability to take legal water samples |
| 117 | 2.43 | 2.38 | Know the functions of a reservoir |
| 118 | 2.02 | 1.78 | Know how to study the flood characteristics of a stream |
| 119 | 2.58 | 2.56 | Knowledge of techniques used to treat water |
| 120 | 2.16 | 2.03 | Knowledge of the Floatation Process |
| 121 | 2.16 | 2.34 | Knowledge of the Continuous Regeneration Process |
| 122 | 2.09 | 1.72 | Knowledge of removing fluorides from water |
| 123 | 2.52 | 2.22 | Ability to do a sanitary survey of water supply |
| 124 | 2.66 | 2.72 | Knowledge of the types of chemicals used for emergency chlorination |
| 125 | 2.60 | 2.72 | Ability to define "potable water" |
| 126 | 2.25 | 1.97 | Knowledge of the Zone of Aeration |
| 127 | 2.33 | 2.09 | Understand quality control methods in water treatment plants |
| 128 | 2.72 | 2.78 | Ability to sample chlorinated water |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 129 | 2.29 | 2.22 | Knowledge of State Urban Water Supply and Sewerage Systems Act |
| 130 | 2.60 | 2.38 | Understand and apply standards for semi-public water and sewage systems |
| 131 | 2.35 | 2.28 | Understand standards of floor space and cubic air space for occupancy |
| 132 | 2.46 | 2.28 | Ability to apply sanitary standards to migratory labor camps |
| 133 | 2.68 | 2.28 | Recognize health hazards at summer camps |
| 134 | 2.27 | 2.28 | Know how to calculate the volume of water required per person |
| 135 | 2.56 | 2.75 | Understand vector control in camps |
| 136 | 2.46 | 2.03 | Understand electrical, sewage, and water hookups in public campsites |
| 137 | 2.35 | 2.28 | Ability to recognize adequate laundry facilities in migrant labor camps |
| 138 | 2.75 | 2.75 | Recognize cross connections between water and sewage systems |
| 139 | 2.29 | 2.25 | Know ratio of plumbing-fixtures-to-population of day camps |
| 140 | 2.24 | 2.34 | Know space requirements for outdoor campsites |
| 141 | 2.38 | 2.03 | Understand fire regulations and standards |
| 142 | 2.51 | 2.38 | Understand and be able to explain use of pesticides in camps |
| 143 | 2.39 | 2.47 | Ability to recognize fire safety hazards in motels and hotels |
| 144 | 2.43 | 2.31 | Recognize type and application of fire extinguishers |
| 145 | 2.36 | 2.38 | Know the reservoir of communicable disease endemic to the area |
| 146 | 2.47 | 2.59 | Know the mode of transmission of vector-borne diseases |
| 147 | 2.37 | 2.25 | Understand definitions of epidemic, endemic, pandemic, sylvan and urban |
| 148 | 2.38 | 2.28 | Understand the relationship between wild animal population and rabies |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 149 | 2.48 | 2.53 | Understand dog and cat control ordinances used in human rabies cases |
| 150 | 2.21 | 2.09 | Understand the transmission of zoonosis |
| 151 | 2.20 | 2.16 | Understand reproduction and physiology of bacteria |
| 152 | 2.39 | 2.28 | Understand the difference between aerobic and anaerobic bacteria |
| 153 | 2.57 | 2.44 | Understand pasteurization, sanitation, and sterilization |
| 154 | 1.92 | 1.50 | Knowledge of the Fluorescent Antibody Test |
| 155 | 2.11 | 2.28 | Knowledge of active and passive immunity |
| 156 | 2.16 | 1.78 | Know the general effects of light on bacteria |
| 157 | 2.06 | 1.78 | Knowledge of intestinal nematodes |
| 158 | 2.02 | 1.75 | Knowledge of Cestodes and Trematodes |
| 159 | 2.16 | 2.00 | Know the term "Thermal Death Time" |
| 160 | 2.55 | 2.56 | Know the meaning of "High-free Residual Chlorine" |
| 161 | 2.35 | 2.13 | Ability to read and evaluate a flow diagram |
| 162 | 2.27 | 2.53 | Know cause of mud ball in filters |
| 163 | 2.72 | 2.81 | Ability to take legal swimming pool water samples |
| 164 | 2.60 | 2.50 | Understand algae control |
| 165 | 2.61 | 2.34 | Understand relationship of pH to chlorine |
| 166 | 2.23 | 2.16 | Know recommended depth of diving area to height of diving board |
| 167 | 2.42 | 2.34 | Know diseases usually associated with natural bathing places |
| 168 | 2.42 | 2.06 | Understand bacterial standards and their application |
| 169 | 2.39 | 2.40 | Understand recirculation systems |
| 170 | 2.42 | 2.09 | Ability to interpret analysis results |
| 171 | 2.67 | 2.69 | Ability to run field tests for chlorine and pH |
| 172 | 2.39 | 2.59 | Know requirements of safety equipment |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 173 | 2.56 | 2.59 | Understand use of chlorine, alum and soda ash |
| 174 | 2.06 | 2.03 | Be able to calculate and maneuver bathing load |
| 175 | 2.16 | 2.18 | Know how to check a leak protector valve |
| 176 | 2.00 | 2.25 | Know how to operate a HTST flow diversion valve |
| 177 | 2.23 | 2.19 | Ability to check time and temperature on both HTST and Batch Pasteurizers |
| 178 | 2.40 | 2.13 | Know bacterial and chemical standards for both raw and pasteurized milk |
| 179 | 2.07 | 2.00 | Understand use of vacuum chamber in odor and taste control |
| 180 | 1.91 | 1.69 | Know how to calculate logarithmic average of bacterial counts |
| 181 | 2.50 | 2.47 | Ability to take legal milk samples |
| 182 | 2.12 | 2.47 | Understand application of the "holding tube" |
| 183 | 2.14 | 2.25 | Know the differential in pressure of raw and pasteurized milk in HTST units |
| 184 | 2.15 | 2.16 | Understand mastitis control |
| 185 | 2.37 | 2.34 | Understand relationship of cow herd health and human disease transmission |
| 186 | 2.42 | 2.56 | Know the significance of coliform bacteria in pasteurized milk |
| 187 | 2.30 | 2.25 | Know the significance of phosphatase in pasteurized milk |
| 188 | 2.45 | 2.41 | Know farm storage milk temperature requirements |
| 189 | 2.37 | 2.16 | Know required contact times and strengths of various disinfectants |
| 190 | 2.58 | 2.70 | Ability to recognize acceptable kitchen facilities |
| 191 | 2.75 | 2.78 | Ability to recognize acceptable toilet facilities |
| 192 | 2.43 | 2.56 | Ability to recognize acceptable sleeping facilities |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 193 | 2.62 | 2.61 | Ability to recognize acceptable bathing facilities |
| 194 | 2.57 | 2.52 | Understand the definitions in the State Housing Code |
| 195 | 2.48 | 2.22 | Know the responsibilities of owners of dwelling |
| 196 | 2.49 | 2.30 | Know the responsibilities of occupants of dwelling |
| 197 | 2.38 | 2.36 | Ability to recognize adequate heating facilities |
| 198 | 2.52 | 2.39 | Know plumbing fixtures required in dwellings |
| 199 | 2.38 | 2.39 | Know regulations relative to handrails on steps |
| 200 | 2.45 | 2.43 | Know meaning of deteriorated and dilapidated |
| 201 | 2.26 | 2.35 | Know window and skylight and/or artificial light required |
| 202 | 2.42 | 2.30 | Know toxic paint and toxic preservative materials |
| 203 | 2.56 | 2.65 | Know rat proofing methods |
| 204 | 2.27 | 2.35 | Know density and space requirements |
| 205 | 2.71 | 2.74 | Know accepted safeguards for various poisons |
| 206 | 2.20 | 2.39 | Ability to recognize Norway Rat and Roof Rat |
| 207 | 2.53 | 2.70 | Know effective rat proofing methods |
| 208 | 2.45 | 2.39 | Know diseases spread by rodents to man |
| 209 | 2.47 | 2.57 | Know house mouse control methods |
| 210 | 2.67 | 2.39 | Ability to recognize rodent harborages |
| 211 | 2.58 | 2.78 | Know standards for storing materials to deter rodents |
| 212 | 2.41 | 2.43 | Ability to recognize restricted substances by name |
| 213 | 2.14 | 2.30 | Ability to estimate size of rodent population |
| 214 | 2.24 | 2.39 | Know tracking powders and how to use them |
| 215 | 2.38 | 2.35 | Know how various diseases are transmitted from rodents to man |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 216 | 2.19 | 2.17 | Ability to estimate age of rodent signs |
| 217 | 2.25 | 2.43 | Know how to mix rodent baits |
| 218 | 2.36 | 2.30 | Know necessity of rat watering points |
| 219 | 2.33 | 2.22 | Understand fumigant methods |
| 220 | 2.30 | 2.52 | Know where IOSHA Laws apply and where local department has responsibility |
| 221 | 2.25 | 2.26 | Know what decibel range hearing loss starts |
| 222 | 2.25 | 2.30 | Know the definition of noise |
| 223 | 2.24 | 2.13 | Understand occupational causes of hearing loss |
| 224 | 2.18 | 2.43 | Know relationship between duration of noise exposure and decibel level |
| 225 | 2.45 | 2.57 | Know where protective clothing must be worn |
| 226 | 2.45 | 2.57 | Know when safety equipment must be readily available |
| 227 | 2.13 | 2.43 | Understand relationship between accident rate and housekeeping |
| 228 | 2.38 | 2.48 | Know "adequate toilet facilities" for number of employees |
| 229 | 2.26 | 2.43 | Know where eating and smoking areas are located in a plant |
| 230 | 2.26 | 2.30 | Know what "threshold limit values" are for toxic chemicals |
| 231 | 2.02 | 2.26 | Understand metric system of measurements |
| 232 | 2.25 | 2.35 | Know significance of oral, dermal, and inhalation exposure |
| 233 | 2.27 | 2.35 | Know what protective clothing is required in dusty conditions |
| 234 | 2.05 | 2.13 | Know how to run field tests for atmospheric contamination |
| 235 | 2.25 | 2.30 | Understand radiation exposure |
| 236 | 2.06 | 2.35 | Ability to use dosimeter and Geiger counter |
| 237 | 1.84 | 2.04 | Understand isotopic forms of elements |
| 238 | 2.10 | 2.35 | Know the significance of alpha, beta, and gamma exposure |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 239 | 2.27 | 2.35 | Understand hazards of continuous X-ray exposure |
| 240 | 2.11 | 1.91 | Know acceptable disposal sites |
| 241 | 2.14 | 2.13 | Know who is responsible for disposal of radioactive waste |
| 242 | 2.16 | 2.09 | Know effect of radiation on living tissue |
| 243 | 1.97 | 2.00 | Have ability to monitor radiation from X-ray machine |
| 244 | 1.97 | 1.78 | Know fission from fusion |
| 245 | 2.38 | 2.52 | Ability to cooperate with Civil Defense Department in catastrophe |
| 246 | 2.06 | 2.09 | Understand the term: Electron, Proton, Neutron |
| 247 | 2.02 | 2.04 | Understand "half life" of an isotope |
| 248 | 2.30 | 2.13 | Know what to do in case of a radioactive spill |
| 249 | 2.27 | 2.57 | Understand use of protective clothing and devices |
| 250 | 2.34 | 2.35 | Ability to run carbon monoxide field test |
| 251 | 2.57 | 2.39 | Ability to recognize dangerous situations in industrial plants |
| 252 | 2.51 | 2.74 | Know good housekeeping practices |
| 253 | 2.35 | 1.74 | Understand occupational diseases caused by harmful situations |
| 254 | 2.19 | 1.83 | Understand physiological distress due to agents in industrial atmosphere |
| 255 | 2.17 | 1.74 | Understand abnormal stress due to improper work methods |
| 256 | 2.47 | 2.35 | Ability to work with plant safety officer |
| 257 | 2.39 | 2.17 | Recognize agents causing disabilities |
| 258 | 2.47 | 2.30 | Recognize conditions causing disabilities and accidents |
| 259 | 2.36 | 2.13 | Know what safety devices are needed in a given situation |
| 260 | 2.41 | 2.13 | Know which agents may cause respiratory disease |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 261 | 2.38 | 2.35 | Know which agents may affect the skin |
| 262 | 2.46 | 2.70 | Know which state department is responsible in case of an industrial accident |
| 263 | 2.14 | 1.96 | Ability to evaluate an industrial hygiene problem |
| 264 | 2.37 | 2.13 | Have completed Red Cross First Aid Training |
| 265 | 2.10 | 2.30 | Understand use of keys in insect identification |
| 266 | 2.42 | 2.52 | Know major disease spread to man by insect |
| 267 | 2.57 | 2.87 | Know insects of public health importance |
| 268 | 2.30 | 1.96 | Know life cycles of insects of public health importance |
| 269 | 2.58 | 2.65 | Know proper use of insecticides |
| 270 | 2.32 | 2.04 | Know how to calculate ppm and mix insecticides |
| 271 | 2.37 | 2.52 | Understand vector-borne disease transmission |
| 272 | 2.43 | 2.57 | Know intermediate hosts of insects of public health importance |
| 273 | 2.56 | 2.61 | Know materials in which flies will lay eggs |
| 274 | 2.56 | 2.35 | Know sanitary storage methods of insect breeding materials |
| 275 | 2.61 | 2.30 | Know mosquito control methods |
| 276 | 2.65 | 2.70 | Ability to recognize mosquito breeding areas |
| 277 | 2.47 | 2.62 | Understand water ponding control as a mosquito control tool |
| 278 | 2.17 | 2.26 | Know the flight range of various mosquitos |
| 279 | 2.32 | 2.48 | Know naturalistic mosquito abatement methods |
| 280 | 2.14 | 2.04 | Know zoonosis indigenous to wild life of your area |
| 281 | 2.18 | 2.13 | Know wild host animal of zoonosis in your area |
| 282 | 2.37 | 2.39 | Know legal procedure to enforce local animal control code |
| 283 | 2.60 | 2.65 | Know proper procedures in a human rabies exposure |
| 284 | 2.29 | 2.43 | Know local requirements for restrictions of numbers of animals |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 285 | 2.43 | 2.70 | Know evidence of lack of sanitary manure storage |
| 286 | 2.16 | 2.43 | Understand acceptable animal feed storage |
| 287 | 2.52 | 2.43 | Ability to cooperate with Humane Society |
| 288 | 2.19 | 2.39 | Know sanitary requirements for stockyards |
| 289 | 2.55 | 2.48 | Know how to handle a rabid animal |
| 290 | 2.01 | 2.00 | Know T.B. and brucellosis control methods in dairy cattle |
| 291 | 1.92 | 2.00 | Know psittacosis control procedures |
| 292 | 2.06 | 2.08 | Know epidemiological procedures for zoonosis |
| 293 | 2.56 | 2.74 | Know how to get samples in safe, legal manner |
| 294 | 2.42 | 2.60 | Know modes of transmission for salmonella from pets to human |
| 295 | 2.42 | 2.43 | Know the route of infection transmission in nursing homes |
| 296 | 2.62 | 2.87 | Ability to recognize unclean conditions by sight and smell |
| 297 | 2.16 | 2.52 | Know illumination standards for institutional kitchens |
| 298 | 2.07 | 2.04 | Know water volume per bed and temperature standards for nursing homes |
| 299 | 2.34 | 2.43 | Know proper use of pesticides in all types of institutions |
| 300 | 2.06 | 2.26 | Know and apply occupancy standards to all types of institutions |
| 301 | 1.96 | 2.04 | Know methods of disinfecting operating rooms |
| 302 | 2.20 | 2.52 | Know acceptable methods of cleaning and disinfecting different kinds of floors |
| 303 | 2.18 | 2.26 | Understand proper location of air intake and exhaust systems |
| 304 | 2.26 | 2.48 | Know proper handling methods of soiled mops |
| 305 | 2.27 | 2.57 | Know when air gaps are required on plumbing fixtures |

TABLE VIII - Continued

| Item No. | IOWA CNF | NEBR. CNF | Item Description |
|---|---|---|---|
| 306 | 2.30 | 2.43 | Know sanitary methods of disposal of dressings and laboratory cultures |
| 307 | 2.24 | 2.39 | Know cleaning methods of refuse chutes and dumbwaiters |
| 308 | 2.20 | 2.39 | Know difference in requirements of cross infection control in nursing homes and hospitals |
| 309 | 2.21 | 2.35 | Understand soiled laundry handling problems in institutions |

The interesting facts displayed in Table VIII are the similarities in the CNF's of most items. In evaluating 38 of the items, the two states have not agreed, one state placing the CNF in the "Highly Necessary" (above 2.50) range and the other state placing the CNF in the "Desirable" (2.00-2.49) range. The ratings of 32 other items were similarly split between the "Desirable" (2.00-2.49) range and "Not Applicable" (below 2.00) range. One item (#28) which Iowa has said is "Highly Necessary" is the ability to apply sanitary standards to privies while Nebraska has indicated this is a "Not Applicable" item. While there may be many reasons for this particular difference, the writer's conclusion is that most of the Nebraska public health professionals were found in the metropolitan areas where privies are illegal while much of Iowa's population is rural where privies are legal and county sanitarians must know the standards they must meet.

# CHAPTER V

## SUMMARY

The principal objective of this study was to identify the competencies required of a sanitarian aide to work effectively in the field of environmental health. For purposes of this study, the job description for a sanitarian aide as stated in the Dictionary of Occupational Titles was used as a reference to the general duties established for the position.

In the survey of literature, the writer could find no studies which had been conducted relative to the competency needs of a sanitarian aide. The writer's search included both a study of the references in college libraries and extensive correspondence with Schools of Public Health and Environmental Science.

The survey population of the study was 250 professional environmental personnel of Iowa and Nebraska. This population was surveyed by means of three specially-constructed questionnaires which had been previously field tested. To analyze the data, the three possible survey item responses were assigned numerical values as follows: Very Necessary - 3; Desirable - 2; Not Applicable - 1. A mean was computed for each item which is designated in this study as the Competency Need Factor (CNF). Usable data were received from 417 returned, usable questionnaires. This represented a return of 55.97 percent for the total research project.

The writer has designated each survey item with a CNF of 2.50 and above as a "very necessary" competency for a sanitarian aide. A survey item with

a CNF of between 2.00 and 2.50 has been designated as a "desirable" competency. An item with a CNF of less than 2.00 has been designated "not applicable" to the sanitarian aide's training.

The amassed data from all the respondents indicate that 85 competencies are important enough to be included in a curriculum for sanitarian aides, 196 others should be included in the curriculum, and 28 should not be included in his training program.

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# APPENDIX A

## TWO YEAR CURRICULUM
## ENVIRONMENTAL HEALTH TECHNICIANS

# TWO YEAR CURRICULUM

# ENVIRONMENTAL HEALTH TECHNICIANS

A CONFERENCE REPORT

ATLANTA, GEORGIA

MAY 27 AND 28, 1970

Conducted by the National Environmental Health Association under
Contract No. PLC-70-5 from the Environmental Health Service,
Public Health Service, Department of Health, Education and Welfare

# I N T R O D U C T I O N

A conference on the education and training of environmental health technicians was held by the National Environmental Health Association on May 27 and 28, 1970 in Atlanta, Georgia. The conference was attended by twenty-one people from academic institutions with two-year or four-year programs in environmental health, from agencies that employ environmental health technicians and sanitarians, and by persons experienced or knowledgeable in training and curriculum development. This conference was held because of the manpower needs in the field of environmental health. There is an increasing utilization of and need for two-year trained environmental health technicians by governmental agencies concerned with environmental control, and by industry. The community colleges developing programs for training environmental technicians need curriculum guidelines. The prediction for future manpower needs, and programs to train people to meet these needs, make the development of curriculum guidelines even more critical.

The changing nature and the increasing intensity of problems in environmental control have made it impractical and impossible for professionals to cope adequately with both technical and professional duties. For example: job analyses indicate that many activities currently performed by the professional sanitarian could be performed by a person with less than baccalaureate level education and training. Thus, a partial solution to the manpower shortage is to train technicians who can handle a significant part of the technical aspects of the work currently being performed by professionals. The technician can be trained in approximately one-half the time at less expense than is required to prepare the entry-level professional. The technician cannot replace the professional, but can be trained to carry on the technical aspects of an environmental health

control program under the supervision of a professional. This allows the professional environmentalist more time to function in areas of planning, developing, administering, evaluating and promoting environmental control programs. The salary range for the technician, when compared with that of the professional, is also appealing to an employer. The overall purpose of the environmental health technician training program is to upgrade the expertise and general technical competency of people available for employment in environmental control programs.

Environmental health technician training can most appropriately be offered by community colleges or junior colleges. Such institutions conduct training programs extending up to two years duration, which may lead to the Associate of Arts degree, or the Associate of Applied Science degree, or to similar associate degrees. Many community colleges and junior colleges are committed to technical and vocational training and currently have many other types of technician training programs, including several in the health fields. They are geared to recruit people into two year training programs and have maximum contact with students desiring this type of training. The community colleges can utilize professionals employed in the surrounding regions to assist in the technical development and implementation of the technician training program and to supplement the faculty responsible for the training program.

The charge to the conference was:

1. Develop a definition for the environmental health technician.

2. Develop a guideline for a two year curriculum for environmental health technicians.

3. Develop a plan for dissemination of the curriculum guidelines.

At the onset of the conference, the participants agreed on three points and then devoted a major effort to the development of curriculum guidelines.

The three points agreed upon were:

1. The acceptance of the description of the environmental Health technician as it appears in the Position-Classification Standards, U. S. Civil Service Commission, Environmental Health Technician Series, GS 689, October, 1969.

2. The environmental health technician should be trained as a generalist so that he can either work across the board in a general environmental control program, or function in a number of specialized areas or activities.

3. The environmental Health technician should be "job ready" when he completes his two year program of study, but he should not be dead-ended. That is, he should be able to transfer into a four year environmental health curriculum with maximum transferability of credit.

The following curriculum guidelines were developed, recognizing that each institution has its own peculiar or unique requirements and goals and is limited by its resources, facilities and faculty. Contemplating such variations, the guidelines are designed to emphasize those topic areas found to be most commonly essential to the development of the "job ready" generalist in environmental health technology.

TWO YEAR ENVIRONMENTAL HEALTH TECHNICIAN PROGRAM

CURRICULUM GUIDELINES

LIBERAL ARTS AND SCIENCE CONTENT

| | Recommended Topics | Desirable Topics |
|---|---|---|
| COMMUNICATIONS: | | |
| | English Composition | Report Writing |
| | | Speech |
| SOCIAL SCIENCES: | | |
| | Sociology | Economics |
| | Political Science<br>Local and State government. | |
| | Psychology<br>Interpersonal and group relationships. | |
| SCIENCES: | | |
| | Algebra | Trigonometry and Geometry. |
| | Physical Science or Introduction to Physics | Ecology |
| | General Chemistry | |
| | General Biology | |
| | General Microbiology with laboratory | |

TWO YEAR ENVIRONMENTAL HEALTH TECHNICIAN PROGRAM

## CURRICULUM GUIDELINES

## TECHNICAL CONTENT

| Recommended Topics | Desirable Topics |
|---|---|
| Water Quality | Industrial Hygiene |
| Air Quality | Noise Control |
| Food Protection | Radiological Health |
| Vector Control | Land Use |
| Solid Wastes | Accident Prevention |
| Shelter | Plan Review |

### SURVEY COURSE--ENVIRONMENTAL HEALTH

A curriculum preparing the environmental health technician should include a course designed to cover all the recommended and desirable topics listed above. This course should be offered early in the curriculum to acquaint the student with the broad scope of the field of environmental control and how these topics relate in a comprehensive environmental health program. The course should be valuable to other students in the school because of the general interest in this basic subject area.

### SURVEY COURSE--PUBLIC HEALTH OR COMMUNITY HEALTH

The student should be introduced to the broad field of public health or community health, of which environmental health is a part. The course should give definition and application of health education methodology and principles, epidemiology, communicable disease control, public health law, and public health organization and administration.

### FIELD TRAINING

Field Training is an essential part of the training of a technician. The field involvement should be comprehensive and of sufficient duration to permit

the student actually to practice the skills to which he has been introduced through lectures, laboratory sessions, problem solving sessions, and field observations. Much of the field involvement should consist of performing activities that will be of value to the training agency and to the community.

CURRICULUM CONTENT

The liberal arts and the sciences in the curriculum should total approximately 40 percent of the two year program. The technical content of the curriculum should total approximately 40 percent of the two year program. The remaining 20 percent of the program should consist of elective courses or special college requirements. The development of a curriculum should be preceded by an analysis or survey of the employment opportunities and skill requirements of the environmental health technician within the region normally served by the institution. Such a study will identify areas of vocational competence which should be emphasized in the technical areas of the curriculum.

VARIATIONS IN CURRICULUM CONTENT

It is recognized that curricula will vary on the basis of regional needs and the organizational pattern of any particular educational institution. Variations are expected between the colleges in the courses offered, in the course titles, and in the actual course content. Each college would be expected to offer a majority of the recommended topics in a comprehensive manner. The remainder of the recommended topics, and the desirable topics, would be incorporated into the survey course in environmental health. A program which does not offer a majority of the recommended topics in a comprehensive manner could not be considered a generalized program.

TRANSFERABILITY OF CREDITS

The courses required and recommended for the two year curriculum should be of such content and level that a majority of the hours taken in the two year

curriculum would be transferable to a four year curriculum in environmental health or related field.

FACULTY QUALIFICATIONS

The instructors of the technical content of the curriculum should have the following minimum qualifications:

a. Three years experience within the general field of environmental health practice.

b. Have recognized professional standing.

c. Possess a B.S. in environmental health or related area of study.

The coordinator of the environmental health technician program should have the following qualifications:

a. Five years experience within the general field of environmental health practice.

b. Have recognized professional standing.

c. Possess a Master's degree which will enhance his competencies in environmental health or in teaching.

CURRENT AND CONTINUING NEEDS

1. There is a need for task analyses of the jobs to be filled by the environmental health technician. This information will assist in the development of specific content needed in environmental health technician training programs. The environmental health technician training programs should be continually reviewed to be certain that there is not "over educating" at the community college level. Seeking to maximize the transferability of credits may endanger the primary goal of realistic preparation of the "job ready" technician.

2. There is a need for occasional review of the curriculum guidelines presented in this report to see that they are looking ahead and preparing the type

and quality of environmental health technicians that are needed in the coming years.

3. There is a need for an effort to coordinate the federal programs and funding for specialized environmental technician training programs so that the various programs complement one another and are not contradictory or damaging to other programs.

4. The environmental health technician will find an increasing demand for his service outside the conventional public health organizational structure. There is a need for a forum of the related professions and the representative employer groups to outline the common goals and objectives which should guide future curriculum development for technician training.

DISTRIBUTION OF CONFERENCE REPORT

The results of this conference will be largely wasted unless the curriculum guidelines that have been developed and the accompanying recommendations are distributed to those persons, agencies, organizations, and institutions which can utilize them and put them into effect. We recommend that this report be circulated to the following:

Federal Agencies

Bureau of Health Professions, Education and Manpower Training, Division of Allied Health Manpower, N.I.H.

Federal Water Quality Administration*

Environmental Health Service*

Dept. of Health, Education and Welfare--Office of Personnel

Office of Education--Vocational Training

Department of Labor

State Agencies

Department of Education--All states

Department of Health#--All states

Office of Comprehensive Health Planning--All states

Professional Organizations

National Environmental Health Association, and each affiliate.

American Public Health Association

International Association of Milk, Food and Environmental Sanitarians--each affiliate.

National Society of Professional Sanitarians--and each affiliate

Conference of Local Environmental Health Administrators

American Intersociety Academy for Certification of Sanitarians

American Society for Engineering Education

Other Organizations

American Association of Junior Colleges

Association of Schools of Allied Health Professions

National Sanitation Foundation--POTEET (Programs of Training and Education in Environmental Technology)

*Succeeded by the Environmental Protection Agency

#Or newly established agencies for environmental control.

TWO YEAR CURRICULUM FOR ENVIRONMENTAL HEALTH TECHNICIANS

PARTICIPANTS

Atlanta, Georgia
May 27-28, 1970

| | |
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UNITED STATES CIVIL SERVICE COMMISSION

POSITION - CLASSIFICATION STANDARDS

GS-698 ENVIRONMENTAL HEALTH TECHNICIAN SERIES GS-698

This series includes positions that involve investigating, evaluating, and providing information on sanitation practices, techniques, and methods for the purpose of identifying, preventing, and eliminating environmental health hazards. Positions in this occupation require a practical knowledge of basic environmental health concepts, principles, methods, and techniques, including survey and inspection techniques and control and eradication methods.

EXCLUSIONS

1. Positions that involve planning, developing, evaluating, and advising on programs concerned with the elimination and prevention of environmental health hazards. These positions are classified in the Sanitarian Series, GS-688.

2. Positions involving inspections or investigations for the primary purpose of enforcing compliance with public health laws and regulations pertaining to food, drug, cosmetics, or to the wholesomeness and purity of food and food products. Such positions are classified in the appropriate series of the Investigation Group, GS-1800.

3. Positions primarily involving grading foods or other commodities, or developing, installing, or administrating quality control programs. Such positions are classified in the appropriate series of the Commodity Quality Control, Inspection and Grading Group, GS-1900.

EXPLANATORY STATEMENT

Environmental Health aids and technicians provide technical support and assistance to the sanitarian or other health specialists (e.g., sanitary engineer, health physicist, health officer). They conduct surveys and implement measures to control the spread of diseases and other health hazards or conditions (e.g., food contamination, air and water pollutants, insect and rodent harborages). They take samples of such materials as water, food, and air, and perform or assist sanitarians in performing tests to determine contamination. They explain how to repair, install, or construct sanitation facilities (e.g., water systems, sewage disposal systems, plumbing), as well as how to maintain and utilize individual facilities. They investigate public and private establishments (e.g., food markets, restaurants, dairy plants, water supplies, medical care facilities) to determine compliance with or violation of public sanitation laws and regulations. However, when the primary purpose of the position is to perform the latter duty, it should be allocated to the appropriate series in the investigation group (e.g., Public Health Inspection Series, GS-1860; Food Inspection Series, GS-1863).

At the higher levels, many of the assignments made to technicians require the same depth of analysis as sanitarian positions. They differ from sanitarian assignments in that the technician is not required to resolve problems that require the application of new methods and techniques or those that require action beyond the specific work assignment. On the

other hand, the knowledges and abilities required for sanitarian work may be different in kind and breadth from those required for technician work, but not necessarily different in grade level. For example, technician work may require a high level of technical or administrative qualifications applicable to specific work assignments based on a comprehensive background of practical experience, training, and skill in applying knowledge of precedents, guides, and techniques.

While all positions require a practical knowledge of basic environmental health concepts, principles, methods, and techniques, the experienced technician must have a detailed knowledge of the laws and regulations governing environmental health practices as well as what constitutes a good environmental health program in one or more of the following, or other comparable environmental health areas:

-Milk and Food
-Water Supply
-Waste
-Insect and rodent
-Shellfish
-Recreation, housing, care facilities, or other institutions.

## TITLES

The title for trainee or developmental jobs (GS-1/3) is Environmental Health Aid. Environmental health aids collect and record adequate data on existing environmental sanitation conditions and initiate corrective action on the health hazards that are fully covered by written guidelines.

The title Environmental Health Technician is established for all non-supervisory positions in this series (GS-4 and above). Illustrative examples of tasks performed by environmental health technicians include the following:

- Conduct investigations to determine the source of outbreaks of diseases (e.g., water supplies, contaminated food, untreated waste);
- Determine sources of, and methods to eliminate or control, insect and rodent breeding and harborage;
- Inspect and evaluate sanitary aspects of rail, sea, and air conveyances;
- Perform water quality tests on individual water supplies and disinfect community water sources and systems; and
- Prepare reports of findings and discuss recommendations with owners or representatives of public and private establishments to secure cooperation in improving sanitation practices.

Those positions which include supervisory responsibilities of such significance as to require supervisory qualifications will be identified by the adding of the prefix, Supervisory, to the basic title.

## EVALUATION NOTES

This material does not include grade-level criteria. The following standards and guide may be used to evaluate environmental health aid and technician positions.

(TS 82)

GS-698 GS-698

Positions concerned with investigative, survey, or testing activities will be evaluated by comparison with the criteria for related occupations such as:

The Biological Technician Series, GS-404, Section II,

The Medical Technician Series, GS-645, and

The Physical Science Technician Series, GS-1311.

Supervisory positions should be evaluated by reference to the Supervisory Grade-Evaluation Guide, Part I.

(TS 82)
October 1969

# APPENDIX B

## SURVEY CORRESPONDENCE

# IOWA WESTERN COMMUNITY COLLEGE

ROBERT D. LOOFT, *Superintendent*

Administrative Offices
and
Council Bluffs Campus
2700 College Road
Council Bluffs, Iowa 51501
Telephone (712) 328-3831

Clarinda Campus
923 East Washington St.
Clarinda, Iowa 51632
Telephone (712) 542-5117

This College is conducting a research project to determine the job competency needs of a sanitarian aide. A study has revealed that further research is necessary in this area and the Iowa State Department of Public Instruction has asked Iowa Western Community College to conduct this research. It is felt that a competency needs study is required to strengthen the curriculum in environmental sanitation courses at the high school and community college level.

You have been selected as a participant in this study because of your position in the public health or environmental programs in your community. The attached survey instrument should not take more than fifteen minutes of your time. Won't you please help us?

The questions on the survey instrument relate to only four possible areas of the sanitarian aide's work. Additional questionnaires will be designed to cover other possible areas of a sanitarian aide's work assignments.

Your immediate response in the enclosed postage-free envelope is requested and gratefully acknowledged in advance.

Sincerely yours,

Harold Pengra
Project Director
IOWA WESTERN COMMUNITY COLLEGE

HP/llm

Enclosure

Sanitarian Aide Competency Needs Survey

IOWA WESTERN COMMUNITY COLLEGE
2700 College Road
Council Bluffs, Iowa 51501

For the purposes of this study, the term Sanitarian Aide is considered to be a person with less than a Bachelor's degree who works independently in the field at a para-professional level under the direct supervision of the professional.

**Column A–** In my opinion, it is highly necessary for the Sanitarian Aide to possess a high degree of proficiency in the skill or attribute listed.

**Column B–** In my opinion, it would be desirable for the Sanitarian Aide to possess some degree of proficiency in the skill or attribute listed.

**Column C–** In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary
B. Desirable
C. Not Applicable

**Check only one column for each skill or attribute listed.**

| | | A | B | C |
|---|---|---|---|---|
| **GENERAL ATTRIBUTES** | | | | |
| 1 | Knowledge of codes, laws, rules & regulations pertaining to work | | | |
| 2 | Ability with public relations and with public | | | |
| 3 | Ability to write meaningful and intelligent reports | | | |
| 4 | Good personal hygiene | | | |
| 5 | Dependable work habits | | | |
| 6 | Knowledge of the professional jargon of the discipline | | | |
| 7 | Understand methods of gathering and preserving evidence | | | |
| 8 | Knowledge of enforcement procedures | | | |
| 9 | Ability to be a court witness | | | |
| 10 | Ability to cooperate and work with other departments and agencies | | | |
| **RESPONSIBLITIES PERTAINING TO PRIVATE WATER SUPPLIES** | | | | |
| 11 | Ability to calculate volumes of water required at an installation | | | |
| 12 | Ability to calculate peak load of a water system | | | |
| 13 | Ability to size systems to meet load requirements | | | |
| 14 | Ability to recognize need of disinfection | | | |
| 15 | Ability to run field test for disinfectant residual | | | |
| 16 | Ability to recognize different types of wells | | | |
| 17 | Ability to recognize cross connections | | | |
| 18 | Know the sanitary precautions for each type of well | | | |
| 19 | Know how to run a "yield and drawdown" test | | | |
| 20 | Know how to disinfect a water source and system | | | |
| 21 | Understand spring development as a domestic water source | | | |
| 22 | Ability to inspect and recognize each type of well construction | | | |
| 23 | Know the possible routes of contamination in each type of well | | | |
| 24 | Ability to sample water supplies | | | |
| 25 | Ability to interpret water supply analysis reports | | | |
| 26 | Know the procedure to seal an abandoned well | | | |
| 27 | Know the public health hazards of a contaminated system | | | |

| | | A | B | C |
|---|---|---|---|---|
| **RESPONSIBILITIES PERTAINING TO PRIVATE SEWAGE DISPOSAL SYSTEMS** | | | | |
| 28 | Know and have the ability to apply standards to privies | | | |
| 29 | Ability to accomplish percolation tests | | | |
| 30 | Know the relationship between soil types and effluent absorption | | | |
| 31 | Ability to read sanitary plot maps and simple blueprints | | | |
| 32 | Ability to design and size systems to fit existing conditions | | | |
| 33 | Ability to inspect existing systems | | | |
| 34 | Ability to recognize acceptable installation | | | |
| 35 | Know the basis of lagoon operation | | | |
| 36 | Ability to size lagoons to a given system | | | |
| 37 | Know lagoon safety requirements | | | |
| 38 | Know lagoon maintenance requirements | | | |
| 39 | Ability to recognize system failure | | | |
| 40 | Know the public health hazards of waste disposal system failure | | | |
| **RESPONSIBILITIES PERTAINING TO NUISANCE COMPLAINTS** | | | | |
| 41 | Ability to recognize public health aspects of a nuisance | | | |
| 42 | Ability to assist pet owners in fly, rodent, and odor control | | | |
| 43 | Ability to differentiate between sanitary and unsanitary conditions | | | |
| 44 | Know areas of a community which excludes specific classes of animals by zoning | | | |
| 45 | Ability to recognize sex of animals and fowl | | | |
| 46 | Ability to estimate approximate age of fowl | | | |
| 47 | Know the procedures in processing citizen-initiated complaints | | | |
| 48 | Ability to recognize noxious weeds | | | |
| 49 | Know proper use of herbicides and pesticides in nuisance control | | | |
| 50 | Ability to recognize all stages of life cycles of disease vectors | | | |
| **RESPONSIBILITIES PERTAINING TO EATING AND DRINKING ESTABLISHMENTS AND VENDING OPERATIONS** | | | | |
| 51 | Understand the S.N.F. standards relative to food service equipment | | | |
| 52 | Ability to run field tests on dishwashing machines and sanitizing solutions | | | |
| 53 | Ability to inspect eating and drinking establishments under applicable codes | | | |
| 54 | Ability to recognize cross connections in plumbing | | | |
| 55 | Ability to size kitchen ventilation systems | | | |
| 56 | Understand sanitization of multi-use utensils | | | |
| 57 | Recognize acceptable single service utensils | | | |
| 58 | Ability to evaluate location of vending machines | | | |
| 59 | Ability to evaluate cleanliness of vending machines | | | |
| 60 | Understand control of pests in food service establishments | | | |
| 61 | Recognize hazardous chemicals and know their uses | | | |
| 62 | Understand the control of pathogenic organisims in food service establishments | | | |
| 63 | Recognize acceptable refrigeration facilities | | | |
| 64 | Recognize safe and unsafe food handling procedures | | | |
| 65 | Recognize good personal hygiene | | | |

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You have been selected as a participant in this study because of your position in the public health or environmental programs in your community. The attached survey instrument should not take more than twenty minutes of your time. Won't you please help us?

The questions on the survey instrument relate to only eight possible areas of the sanitarian aide's work. An additional questionnaire will be designed to cover other possible areas of a sanitarian aide's work assignments.

Your immediate response in the enclosed postage-free envelope is requested and gratefully acknowledged in advance.

Sincerely yours,

Harold Pengra

Harold Pengra
Project Director
IOWA WESTERN COMMUNITY COLLEGE

HP/mlo

Enclosure

Sanitarian Aide Competency Needs Survey
IOWA WESTERN COMMUNITY COLLEGE
2700 College Road
Council Bluffs, Iowa 51501



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Column C– In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary
B. Desirable
C. Not Applicable

| | A | B | C |
|---|---|---|---|
| AIR POLLUTION | | | |
| 66. Be able to define air pollution. | | | |
| 67. Know the primary gaseous components in the atmosphere. | | | |
| 68. Know what the adiabatic lapse rate is. | | | |
| 69. Know what a temperature inversion is. | | | |
| 70. Know the effects of meteorology and topography on air pollution. | | | |
| 71. Name five major sources of air pollution. | | | |
| 72. Name the six pollutants specified in the Clean Air Act. | | | |
| 73. Know the local ambient air quality standards for each of the six pollutants. | | | |
| 74. Know three respiratory diseases that tend to be aggravated by air pollution. | | | |
| 75. Be able to name three air pollution control devices. | | | |
| 76. Be able to discuss the synergistic effect of particulate and sulfur dioxide. | | | |
| 77. Know the Ringelmann System of defining visible air pollutants. | | | |
| 78. Know the various means used to monitor air pollution. | | | |
| 79. Know several deleterious effects of air pollution other than health effects. | | | |
| 80. Understand the relationship between air pollutants and allergies. | | | |
| 81 Understand Air Pollution warnings, alerts and emergencies. | | | |

| SOLID WASTE CONTROL | | | |
|---|---|---|---|
| 82. Knowledge of Soils. | | | |
| 83. Ability to operate landfill equipment. | | | |
| 84. Knowledge of acceptable roads within the landfill. | | | |
| 85. Know how to control blow paper. | | | |
| 86. Understand the significance and control of leachate. | | | |
| 87. Know proper compaction and cover procedures. | | | |
| 88. Ability to evaluate compaction equipment. | | | |
| 89. Ability to calculate volumes of refuse and cover material. | | | |
| 90. Ability to route pickup crews. | | | |
| 91. Know maintenance procedures on equipment. | | | |
| 92. Estimate net weight on volume of loads. | | | |
| 93. Know sanitary landfill standards. | | | |
| 94. Knowledge of a Systems Analysis Concept. | | | |
| 95. Knowledge of Volume Reductions Systems. | | | |
| 96. Knowledge of vector control. | | | |
| 97. Knowledge of sanitation at a transfer station. | | | |
| 98. Know refuse control measure at camps and transient lodging facilities. | | | |
| 99. Understand community-wide solid waste control methods. | | | |

| | A | B | C |
|---|---|---|---|
| **INDUSTRIAL NOISE** | | | |
| **100.** Understand definition of noise as compared to sound. | | | |
| **101.** Understand undesirable hearing changes as result of noise levels. | | | |
| **102.** Ability to define decibels. | | | |
| **103.** Ability to define frequencies in cycles per second. | | | |
| **104.** Knowledge of pressure level of noise. | | | |
| **105.** Knowledge of frequency of noise. | | | |
| **106.** Know what an ondimeter is. | | | |
| **107.** Knowledge of acoustical or sound-absorbing walls. | | | |
| **108.** Knowledge of value of sound muffs. | | | |
| **109.** Know principal sources of community noises. | | | |
| **110.** Understand noise prevention methods. | | | |
| **111.** Understand noise abatement methods. | | | |
| **112.** Understand application of sound proofing buildings and offices. | | | |
| **113.** Know acceptable standards of noise levels for homes and industry. | | | |
| **114.** Know the level of decibels that causes some permanent hearing loss. | | | |
| **WATER POLLUTION CONTROL** | | | |
| **115.** Know the potential ways for increasing the usable water supply. | | | |
| **116.** Ability to take legal water samples. | | | |
| **117.** Know the functions of a reservior. | | | |
| **118.** Know how to study the flood characteristics of a stream. | | | |
| **119.** Knowledge of techniques used to treat water. | | | |
| **120.** Knowledge of the Floatation Process. | | | |
| **121.** Knowledge of the Continuous Regeneration Process. | | | |
| **122.** Knowledge of removing flourides from water. | | | |
| **123.** Ability to do a sanitary survey of water supply. | | | |
| **124.** Knowledge of the types of chemicals used for emergency chlorination. | | | |
| **125.** Ability to define "potable water." | | | |
| **126.** Knowledge of the Zone of Aeration. | | | |
| **127.** Understand quality control methods in water treatment plants. | | | |
| **128.** Ability to sample chlorinated water. | | | |
| **129.** Knowledge of State Urban Water Supply and Sewerage Systems Act. | | | |
| **TRANSIENT LODGING INSPECTION** | | | |
| **130.** Understand and apply standards for semi-public water and sewage systems. | | | |
| **131.** Understand standards of floor space and cubic air space for occupancy. | | | |
| **132.** Ability to apply sanitary standards to migratory labor camps. | | | |
| **133.** Recognize health hazards at summer camps. | | | |
| **134.** Know how to calculate the volume of water required per person. | | | |
| **135.** Understand vector control in camps. | | | |
| **136.** Understand electrical, sewage, and water hookups in public camp sites. | | | |
| **137.** Ability to recognize adequate laundry facilities in migrant labor camps. | | | |
| **138.** Recognize cross connections between water and sewage systems. | | | |
| **139.** Know ratio of plumbing-fixtures-to-population of day camps. | | | |
| **140.** Know space requirements for outdoor campsites. | | | |
| **141.** Understand fire regulations and standards. | | | |
| **142.** Understand and be able to explain use of pesticides in camps. | | | |
| **143.** Ability to recognize fire safety hazards in motels and hotels. | | | |
| **144.** Recognize type and application of fire extinguishers. | | | |

| | A | B | C |
|---|---|---|---|
| COMMUNICABLE DISEASE CONTROL | | | |
| 145. Know the reservoir of communicable disease endemic to the area. | | | |
| 146. Know the mode of transmission of vector-borne diseases. | | | |
| 147. Understand definitions of epidemic, endemic, pandemic, sylvan and urban. | | | |
| 148. Understand the relationship between wild animal population and rabies. | | | |
| 149. Understand dog and cat control ordinances used in human rabies cases. | | | |
| 150. Understand the transmission of zoonosies. | | | |
| 151. Understand reproduction and physiology of bacteria. | | | |
| 152. Understand the difference between aerobic and anaerobic bacteria. | | | |
| 153. Understand pasteurization, sanitation, and sterilization. | | | |
| 154. Knowledge of the Flourescent Antibody Test. | | | |
| 155. Knowledge of active and passive immunity. | | | |
| 156. Know the general effects of light on bacteria. | | | |
| 157. Knowledge of intestinal nematodes. | | | |
| 158. Knowledge of Cestodes and Trematodes. | | | |
| 159. Know the term "Thermal Death Time." | | | |

| SWIMMING POOL INSPECTION | | | |
|---|---|---|---|
| 160. Know the meaning of "High-free Residual Chlorine." | | | |
| 161. Ability to read and evaluate a flow diagram. | | | |
| 162. Know cause of mud ball in filters. | | | |
| 163. Ability to take legal swimming pool water samples. | | | |
| 164. Understand algae control. | | | |
| 165. Understand relationship of pH to chlorine. | | | |
| 166. Know recommended depth of diving area to height of diving board. | | | |
| 167. Know diseases usually associated with natural bathing places. | | | |
| 168. Understand bacterial standards and their application. | | | |
| 169. Understand recirulation systems. | | | |
| 170. Ability to interpret analysis results. | | | |
| 171. Ability to run field tests for chlorine and pH. | | | |
| 172. Know requirements of safety equipment. | | | |
| 173. Understand use of chlorine, alum and soda ash. | | | |
| 174. Be able to calculate and maneuver bathing load. | | | |

| MILK INSPECTION | | | |
|---|---|---|---|
| 175. Know how to check a leak protector valve. | | | |
| 176. Know how to operate a HTST flow diversion valve. | | | |
| 177. Ability to check time and temperature on both HTST and Batch Pasterurizers. | | | |
| 178. Know bacterial and chemical standards for both raw and pasteurized milk. | | | |
| 179. Understand use of vacuum chamber in odor and taste control. | | | |
| 180. Know how to calculate logarithmic average of bacterial counts. | | | |
| 181. Ability to take legal milk samples. | | | |
| 182. Understand application of the "holding tube." | | | |
| 183. Know the differential in pressure of raw and pasteurized milk in HTST units. | | | |
| 184. Understand mastitis control. | | | |
| 185. Undstand relationship of cow herd health and human disease transmission. | | | |
| 186. Know the significance of Coliform bacteria in pasteurized milk. | | | |
| 187. Know the significance of phosphatase in pasteurized milk. | | | |
| 188. Know farm storage milk temperature requirements. | | | |
| 189. Know required contact times and strengths of various disinfectants. | | | |

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The questions on this survey instrument relate to only eight possible areas of the sanitarian aide's work. This is the final questionnaire of this project.

Your patience, cooperation, and assistance has been invaluable and I gratefully express my thanks to you.

Your immediate response in the enclosed postage-free envelope is requested.

Sincerely yours,

Harold Pengra
Project Investigator
Iowa Western Community College

Sanitarian Aides Competency Needs Survey
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Column A– In my opinion, it is highly necessary for the Sanitarian Aide to possess a high degree of proficiency in the skill or attribute listed.

Column B– In my opinion, it would be desirable for the Sanitarian Aide to possess some degree of proficiency in the skill or attribute listed.

Column C– In my opinion, the skill or attribute listed is not applicable to the duties and responsibilities performed by a Sanitarian Aide.

A. Highly Necessary

B. Desirable

C. Not Applicable

| HOUSING INSPECTION | A | B | C |
|---|---|---|---|
| 190. Ability to recognize acceptable kitchen facilities. | | | |
| 191. Ability to recognize acceptable toilet facilities. | | | |
| 192. Ability to recognize acceptable sleeping facilities. | | | |
| 193. Ability to recognize acceptable bathing facilities. | | | |
| 194. Understand the definitions in the State Housing Code. | | | |
| 195. Know the responsibilites of owners of dwelling. | | | |
| 196. Know the responsibilites of occupants of dwelling. | | | |
| 197. Ability to recognize adequate heating facilities. | | | |
| 198. Know plumbing fixtures required in dwellings. | | | |
| 199. Know regulations relative to handrails on steps. | | | |
| 200. Know meaning of deteriorated and delapidated. | | | |
| 201. Know window and skylite and/or artifical light required. | | | |
| 202. Know toxic paint and toxic preservative materials. | | | |
| 203. Know rat proofing methods. | | | |
| 204. Know density and space requirements. | | | |

| RODENT CONTROL | A | B | C |
|---|---|---|---|
| 205. Know accepted safe guards for various poisons. | | | |
| 206. Ability to recognize Norway Rat & Roof Rat. | | | |
| 207. Know effective rat proofing methods. | | | |
| 208. Know diseases spread by rodents to man. | | | |
| 209. Know housemouse control methods. | | | |
| 210. Ability ro recognize rodent harborages. | | | |
| 211. Know standards for storing materials to deter rodents. | | | |
| 212. Ability to recognize restricted substances by name. | | | |
| 213. Ability to estimate size of rodent population. | | | |
| 214. Know tracking powders and how to use them. | | | |
| 215. Know how various diseases are transmitted from rodents to man. | | | |
| 216. Ability to estimate age of rodent signs. | | | |
| 217. Know how to mix rodent baits. | | | |
| 218. Know necessity of rat watering points. | | | |
| 219. Understand fumigant methods. | | | |

| OCCUPATIONAL SAFETY INSPECTION | A | B | C |
|---|---|---|---|
| 220. Know where IOSHA Laws apply and where local department has responsibility. | | | |
| 221. Know what decible range hearing loss starts. | | | |
| 222. Know the definition of noise. | | | |
| 223. Understand occupational causes of hearing loss. | | | |
| 224. Know relationship between duration of noise exposure & decible level. | | | |
| 225. Knows where protective clothing must be worn. | | | |
| 226. Knows when safety equipment must be readly available. | | | |
| 227. Understands relationship between accident rate and housekeeping. | | | |
| 228. Know "adequate toilet facilities" for number of employees. | | | |
| 229. Know where eating and smoking areas are located in a plant. | | | |
| 230. Know what "threshold limit values" are for toxic chemicals. | | | |
| 231. Understand metric system of measurements. | | | |
| 232. Know significance of oral, dermal, and inhalation exposure. | | | |
| 233. Know what protective clothing is required in dusty conditions. | | | |
| 234. Know how to run field tests for atmospheric contamination. | | | |

| RADIOLOGICAL INSPECTION | A | B | C |
|---|---|---|---|
| 235. Understand radiation exposure. | | | |
| 236. Ability to use dosimeter and gieger counter. | | | |
| 237. Understand isotopic forms of elements. | | | |
| 238. Know the significance of alpha, beta, and gamma exposure. | | | |
| 239. Understand hazards of continuous x-ray exposure. | | | |
| 240. Know acceptable disposal sites. | | | |
| 241. Know who is responsible for disposal of radio-active waste. | | | |
| 242. Know effect of radiation on living tissue. | | | |
| 243. Have ability to monitor radiation from x-ray machine. | | | |
| 244. Know fission from fusion. | | | |
| 245. Ability to cooperate with Civil Defense Department in catastrophe. | | | |
| 246. Understand the term: Electron, Proton, Neutron. | | | |
| 247. Understand "half life" of an isotope. | | | |
| 248. Know what to do in case of a radio active spill. | | | |
| 249. Understand use of protective clothing & devices. | | | |

| INDUSTRIAL SANITATION | A | B | C |
|---|---|---|---|
| 250. Ability to run carbon monoxide field test. | | | |
| 251. Ability to recognize dangerous situations in industrial plants. | | | |
| 252. Know good housekeeping practices. | | | |
| 253. Understand occupational diseases caused by harmful situations. | | | |
| 254. Understand physiological distress due to agents in industrial atmosphere. | | | |
| 255. Understand abnormal stress due to improper work methods. | | | |
| 256. Ability to work with piant safety officer. | | | |
| 257. Recognize agents causing disabilities. | | | |
| 258. Recognize conditions causing disabilities and accidents. | | | |
| 259. Know what safety devices are needed in a given situation. | | | |
| 260. Know which agents may cause respiratory disease. | | | |
| 261. Know which agents may effect the skin. | | | |
| 262. Know which State Department is responibile in case of an industrial accident. | | | |
| 263. Ability to evaluate an industrial hygiene problem. | | | |
| 264. Have completed Red Cross First Aid Training. | | | |

| INSECT CONTROL | A | B | C |
|---|---|---|---|
| 265. Understand use of keys in insect identification. | | | |
| 266. Know major disease spread to man by insect. | | | |
| 267. Know insects of public health importance. | | | |
| 268. Know life cycles of insects of public health importance. | | | |
| 269. Know proper use of insecticides. | | | |
| 270. Know how to calculate ppm and mix insecticides. | | | |
| 271. Understand vector borne disease transmission. | | | |
| 272. Know intermediate hosts of insects of public health importance. | | | |
| 273. Know materials in which flies will lay eggs. | | | |
| 274. Know sanitary storage methods of insect breeding materials. | | | |
| 275. Know mosquito control methods. | | | |
| 276. Ability to recognize mosquito breeding areas. | | | |
| 277. Understand water ponding control as a mosquito control tool. | | | |
| 278. Know the flight range of various mosquitos. | | | |
| 279. Know naturalistic mosquito abatement methods. | | | |

| ANIMAL CONTROL | A | B | C |
|---|---|---|---|
| 280. Know zoonosis indigenous to wild life of your area. | | | |
| 281. Know wild host animal of zoonosis in your area. | | | |
| 282. Know legal procedure to enforce local animal control code. | | | |
| 283. Know proper procedures in a human rabies exposure. | | | |
| 284. Know local requirements for restrictions of numbers of animals. | | | |
| 285. Know evidence of lack of sanitary manure storage. | | | |
| 286. Understand acceptable animal feed storage. | | | |
| 287. Ability to cooperate with Humane Society. | | | |
| 288. Know sanitary requirements for stockyards. | | | |
| 289. Know how to handle a rabid animal. | | | |
| 290. Know T. B. and Brucellosis Control methods in dairy cattle. | | | |
| 291. Know Psittacosis control procedures. | | | |
| 292. Know epidemiological procedures for zoonosis. | | | |
| 293. Know how to get samples in safe, legal manner. | | | |
| 294. Know modes of transmission for salmonella from pets to human. | | | |

| INSTITUTIONAL INSPECTION | A | B | C |
|---|---|---|---|
| 295. Know the route of infection transmission in nursing homes. | | | |
| 296. Ability to recognize unclean conditions by sight and smell. | | | |
| 297. Know illumination standards for institutional kitchens. | | | |
| 298. Know water volumn per bed and temperature standards for nursing home. | | | |
| 299. Know proper use of pesticides in all types of institutions. | | | |
| 300. Know and apply occupancy standards to all types of institutions. | | | |
| 301. Know methods of disinfecting operating rooms. | | | |
| 302. Know acceptable methods of cleaning & disinfecting different kinds of floors. | | | |
| 303. Understand proper location of air intake and exhaust systems. | | | |
| 304. Know proper handling methods of soiled mops. | | | |
| 305. Know when air gaps are required on plumbing fixtures. | | | |
| 306. Know sanitary methods of disposal of dressings and laboratory cultures. | | | |
| 307. Know cleaning methods of refuse shoots & dumb waiters. | | | |
| 308. Know difference in requirements of cross infection control in nursing homes and hospitals. | | | |
| 309. Understand soiled laundry handling problems in institutions. | | | |

H-3197