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USER EVALUATION OF CERL AIR, WATER/WASTEWATER, AND SOLID WASTE --ETC(U)
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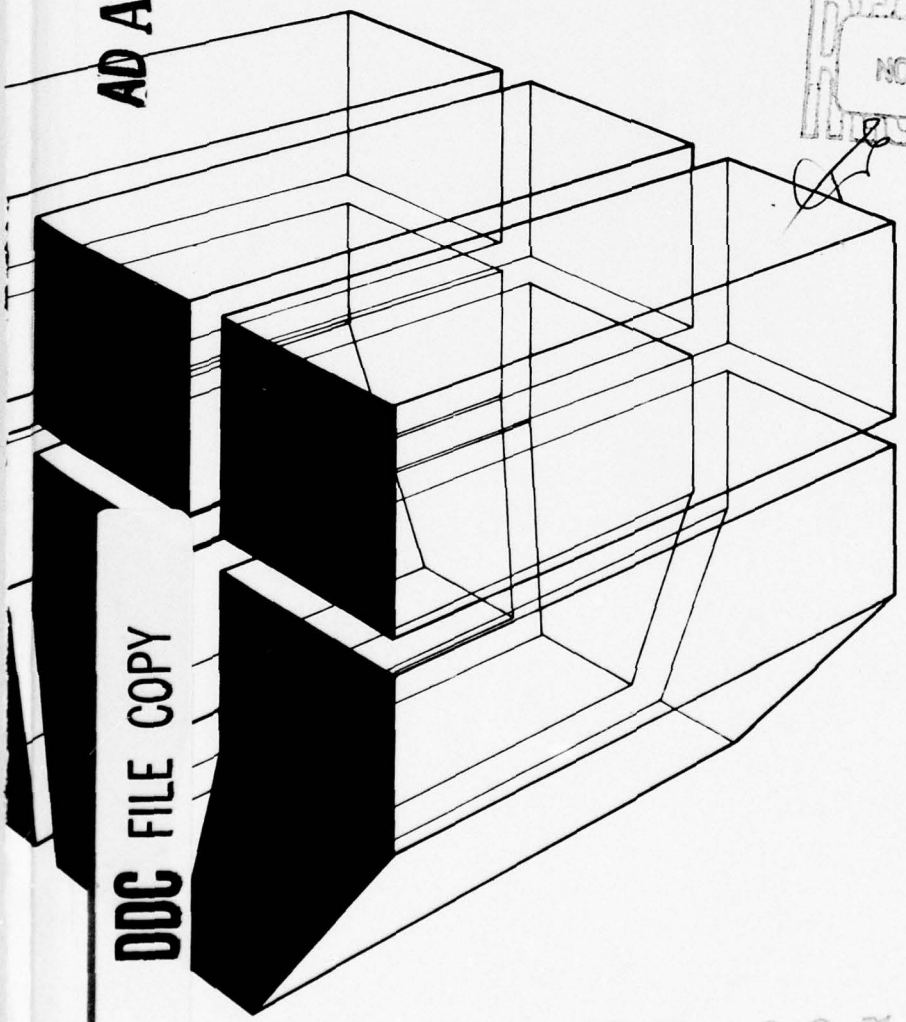
USER EVALUATION OF CERL AIR, WATER/WASTEWATER, AND SOLID WASTE SURVEY GUIDELINES



by
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This report presents a user evaluation of three installation pollution survey guidelines published by the Construction Engineering Research Laboratory for the areas of air, water/wastewater, and solid waste. The three guidelines are: (1) *Air Pollution Survey Guidelines* (CERL-TR-N-5/ADA029633), (2) *Water/Wastewater Survey Guidelines* (CERL-TR-N-11/ADA033223), and (3) *Installation Solid Waste Survey Guidelines* (CERL-TR-E-75/ADA018879). These guidelines were evaluated by users to such quality parameters as comprehensiveness, practicality, and Army

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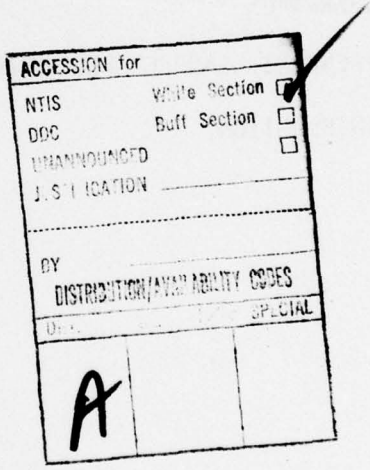
relevance. The user evaluation revealed that the overall rating of these guidelines was generally "excellent" to "good." Suggested areas of improvement were: (1) simplifying or eliminating the highly technical areas, (2) expanding information and coverage of emission factors, (3) providing more detailed information on state pollution regulations, (4) providing more examples on principles presented in the guidelines, (5) providing more information on stream flow measurement, and (6) providing more information on conducting air pollution emission inventories.

FOREWORD

This investigation was performed for the Directorate of Military Construction, Office of the Chief of Engineers (OCE), under Project 4A162121A896, "Environmental Quality for Construction and Operation of Military Facilities"; Task 01, "Environmental Quality Management for Military Facilities"; Work Unit 004, "Characterization of Wastes From Army Installations." The QCR is 1.03.006(3). The OCE Technical Monitor was Mr. V. Gottschalk, DAEN-MCE-D.

This investigation was performed by the Environmental Division (EN), U.S. Army Construction Engineering Research Laboratory (CERL). CERL personnel directly involved in this investigation were V. V. Singh and B. A. Donahue.

Dr. R. K. Jain is Chief of EN. COL J. E. Hays is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.



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USER EVALUATION OF CERL AIR, WATER/WASTEWATER, AND SOLID WASTE SURVEY GUIDELINES

1 INTRODUCTION

Background

During FY75 and FY76, CERL published a series of installation pollution survey guidelines in the areas of air, water/wastewater, and solid waste. Designed for use by the installation Directorate of Facilities Engineering (DFAE) personnel, the guidelines present survey methodologies for acquiring relevant and accurate waste characterization data which are important in effectively and economically planning and implementing pollution control programs, and in preparing environmental reports required by various Federal, state, and local legislation.

Air Pollution Survey Guidelines[1] presents techniques for developing a comprehensive air pollution management plan and contains information on emission inventory procedures, source categorization, emission calculations, and regulation comparisons. It discusses air pollution dispersion and factors affecting dispersion, such as source characteristics, meteorological factors, and physiological effects. A section about ambient air monitoring discusses the classification of common air pollutants and some general principles of an ambient air monitoring network such as instrument selection and optimum instrument siting.

Water/Wastewater Survey Guidelines[2] provides assistance in planning and performing water/wastewater surveys. It provides the format for planning an appropriate survey, given a specific need for data. The types of surveys covered include (1) regional and installation surveys designed to gather background information for regulation compliance, (2) waste source evaluation surveys, and (3) ambient water quality evaluation surveys, which provide information for regulation compliance inquiries, environmental impact analyses, problem characterizations, and design analyses. Additionally, the report provides background information on performing mass balances, developing sampling points, evaluating wastewater sources, and taking flow measurements.

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1 Schanche, G. W., and B. A. Donahue, *Air Pollution Survey Guidelines for Army Installations*, Technical Report N-5/ADA029633 (U.S. Army Construction Engineering Research Laboratory [CERL], July 1976).

2 Schanche, G. W., L. A. Greep, J. R. Cannon, and B. A. Donahue, *Water/Wastewater Survey Guidelines*, Technical Report N-11/ADA033223 (CERL, November 1976).

Solid Waste Survey Guidelines[3] provides techniques for developing a comprehensive solid waste management plan. The report contains information on how to determine legal constraints, characterize specific waste sources, evaluate current management programs, and establish survey requirements. The report describes techniques for determining the quantity and physical composition of waste streams and provides guidelines for developing sampling programs.

Purpose

The purposes of this study were (1) to conduct a user evaluation of CERL guidelines with respect to such quality parameters as comprehensiveness, practicality, and Army relevance, and, (2) to document any changes which may be necessary to make the guidelines truly responsive and meaningful for installation planning, operating, and maintenance personnel.

Approach

CERL initiated the user evaluation program in FY76 at nine Army installations which were recommended for participation in the program by HQ FORSCOM based on the following criteria:

1. Installations were either expected to have previous waste characterization survey experience in the pollution area being evaluated or were expected to need waste characterization data in the near future.

2. The installation DFAE personnel actually participating in the user evaluation were expected to be qualified, either by education or by experience, in the applicable pollution area.

Other criteria used to select the nine sample installations were geographical distribution, installation population, and installation activity. Consequently, the selected installations (see Table 1) represented all parts of the Continental United States (CONUS), plus Alaska and Hawaii. The daytime population, including military as well as civilian personnel, varied from 5400 to 31,200. The major activities at these installations included personnel administration; combat training and operational planning; housing, feeding, and health care of soldiers and their families; and off-duty recreational and educational opportunities for installation personnel.

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[3] hanche, G. W., L. A. Greep, and B. A. Donahue, *Installation Solid te Survey Guidelines*, Technical Report E-75/ADA018879 (CERL, Octo- 1975).

The Sanitation Branch Chief and the Master Planning Branch Chief at each participating installation reviewed the guidelines thoroughly and then completed a questionnaire. The questionnaire consisted mostly of "closed" questions which offered the participants a choice of alternative replies (e.g., multiple choice). A limited number of "open" questions gave participants the opportunity to provide their own input in areas not specifically covered by the "closed" questions and provided space for lengthy comments, etc. The appendix provides a sample questionnaire for the *Installation Solid Waste Survey Guidelines*.

The questionnaire results provided evaluation of the guidelines and revealed information relating to an individual installation's environmental background (such as number of employees involved with installation pollution control programs, these employees' education and experience, and the installation's current practices and future needs in the respective environmental areas). The guidelines evaluation section of the questionnaires provided the following information:

1. User evaluation of the technical contents of the guidelines with respect to presentation, conciseness, comprehensiveness, practical applicability, and adequacy of reference materials.

2. Responsiveness of the guidelines with respect to the waste characterization needs of the installation.

3. Specific portions of the guidelines which the user found most useful and least useful.

4. User recommendations for changes, improvements, additions, and deletions to make the guidelines more meaningful and comprehensive.

Table 1

Installations Selected to Participate
in the User Evaluation of the Guidelines

1. Fort Carson, Colorado*
2. Presidio of San Francisco, California
3. Fort Stewart, Georgia
4. Fort Drum, New York
5. Fort Shafter, Hawaii
6. Fort Ord, California
7. Fort Polk, Louisiana*
8. Fort Richardson, Alaska*
9. Fort Meade, Maryland

* Installations failing to return the questionnaire.

2 FINDINGS

General

Of the nine installations selected to participate in the user evaluation, only two failed to return the questionnaires. The questionnaires returned from the remaining seven installations were generally well answered and complete. It was determined that the data provided in the questionnaires were sufficient for valid assessment of the desired information. Every question was analyzed, quantitatively or qualitatively, depending on the nature of the particular question. It was determined, however, that statistical analyses of the data would be inappropriate because of the small number of participants. Table 2 lists the installations which evaluated Air, Water/Wastewater, and Solid Waste Survey Guidelines, respectively.

Table 2
Installations Participating in the Evaluation
of Air, Water/Wastewater, and Solid Waste Survey Guidelines

Air Pollution Survey Guidelines for Army Installations

Fort Stewart, Georgia
Fort Drum, New York
Fort Shafter, Hawaii
Fort Meade, Maryland

Water/Wastewater Survey Guidelines

Presidio of San Francisco, California
Fort Shafter, Hawaii
Fort Polk, Louisiana

Installation Solid Waste Survey Guidelines

Fort Shafter, Hawaii
Fort Ord, California
Fort Polk, Louisiana
Fort Meade, Maryland

Current Waste Survey Background of Participating Installations

Seven individuals from four installations evaluated the *Installation Solid Waste Survey Guidelines*. The number of employees and the type and size of solid waste facilities were, as expected, directly related to the population of the individual installation. However, only seven out of 37 employees at all four installations had any formal education and/or experience in the solid waste management area. Each installation had at least one solid waste facility (sanitary landfill), and three of them had incinerators. One installation had been designated by the Army as the site for paper recovery and recycling at the end of FY77, while another installation was currently recovering and recycling paper. Solid waste surveys had been conducted at all four installations. The primary purpose of most of these surveys was to evaluate current solid waste management programs, such as collection and disposal systems, sanitary landfill and incinerator operations, and resource recovery and recycling programs. In a few cases, the survey gathered background information either for environmental impact analyses or for estimating the amount of solid waste generated in order to design new sanitary landfills and/or incinerators.

Four individuals from three installations evaluated the *Water/Wastewater Survey Guidelines*. The number of employees responsible for water/wastewater management at each of the three surveyed installations was directly related to the individual installation's population. However, seven of 27 employees had some formal education and/or experience in the water/wastewater management area (a slightly better ratio than for solid waste). All three installations had conducted two or more water/wastewater surveys in the past. One installation had conducted four water/wastewater surveys in less than 2 years. The four most common reasons for conducting these surveys were: (1) to provide engineering studies for wastewater treatment facilities, (2) to assess ambient water quality, (3) to respond to National Pollutant Discharge Elimination System (NPDES) permit requirements, and (4) to provide background information for preparing environmental impact assessments and statements.

Five individuals from four installations evaluated the *Air Pollution Survey Guidelines for Army Installations*. In relation to the total number of employees working in the Sanitation Branch, the number of employees having some degree of formal education and/or training in the air pollution area was about the same as for the solid waste area. All but one of the surveyed installations had conducted air pollution surveys in the past. The most frequent reasons for these surveys were inventory of stationary air pollution sources for regulatory compliance reports, and collecting background information for environmental impact analyses and statements.

It should be pointed out that the Sanitation Branch at an Army installation may not always be responsible for air, water/wastewater, and solid waste management. Consequently, personnel trained in one of these areas may belong to some other organizational element in the installation, and therefore, may have been excluded in these figures.

User Evaluation of the Guidelines

Eighty-five percent of all evaluators were able to read each report in 4 to 8 hours. Some evaluators were even able to re-read certain portions of the report during this time. All sections of the three reports were re-read by at least one evaluator for several reasons, the most common being that the section covered material that the evaluator either knew well, or wanted to know more about. In other instances, evaluators reported that they had to re-read portions of these reports to understand or clarify questions about the subject matter. All three reports were judged "good" to "very good" with respect to such quality parameters as accomplishment of stated objectives, comprehensiveness, clarity, and organization of technical matter. As technical references for air, water/wastewater, and solid waste survey techniques, the reports were found to serve the needs of installation DFAE personnel (see Tables 3, 4, and 5). The following sections provide a detailed discussion about more substantive findings from the questionnaire information.

Installation Solid Waste Survey Guidelines

Seven individuals from four installations evaluated this report. Table 6 summarizes the information generated from the evaluation of individual chapters. All chapters of this report were generally rated "good" with respect to various quality parameters. Most evaluators found that the information was of practical usefulness, interesting, and fulfilling to their needs. Substantive comments were made on Chapters 3, 4, and 5 and on Appendices A, B, and C.

Chapter 3 - Survey Guidelines. The contents of this chapter were rated "fair" with respect to comprehensiveness by 43 percent of the evaluators. A substantial number of evaluators indicated that the technical matter could not be gainfully used in practice and that the material was not responsive to their present or future needs. However, a careful analysis of the user comments revealed that only one portion of this chapter was responsible for these somewhat lower ratings. The "sample population size" section of this chapter provides guidance in calculating the number of samples required for composition and weight/volume determination. The procedures for determining moderately precise and very precise estimates require statistical techniques to determine the sample size which will insure that results fall within a

Table 3

Overall Evaluation of Installation
Solid Waste Survey Guidelines

a. Ratings With Respect to Various Quality Parameters

Quality Parameter	Rating (%) Excellent 1	2	3	4	Poor 5
Accomplishment of objectives stated in this report	33	66			
Comprehensiveness of technical material	33	66			
Clarity of technical material		66	33		
Organization of the report	50	33	17		
Adequacy of the report as a technical reference on installation pollution surveys	33	50	17		

b. Response With Respect to Responsiveness and Usefulness as a Technical Reference

Question	Response (%) Yes	No
Is this report responsive to your needs in the solid waste management area?	86	14
Do you think you will use this report as a technical reference in the future for solid waste surveys?	100	

Table 4

Overall Evaluation of Water/Wastewater Survey Guidelines

a. Ratings With Respect to Various Quality Parameters

Quality Parameter	Rating (%) Excellent 1	2	3	4	Poor 5
Accomplishment of objectives stated in the report	1	2	3	4	5
Comprehensiveness of technical material		100			
Clarity of technical material		50	25	25	
Organization of the report	50		50		
Adequacy of the report as a technical reference on installation pollution surveys	25	50	25		

b. Response With Respect to Responsiveness and Usefulness as a Technical Reference

Question	Response (%) Yes	No
Is this report responsive to your needs in the water/wastewater management area?	75	25
Do you think you will use this report as a technical reference for future water/wastewater surveys?	100	-

Table 5

Overall Evaluation of Air Pollution Survey
Guidelines for Army Installations

a. Ratings With Respect to Various Quality Parameters

Quality Parameter	Rating (%) Excellent 1	2	3	4	Poor 5
Accomplishment of objectives stated in the report	60	20	20		
Comprehensiveness of technical material	40	40	20		
Clarity of technical material	20	60	20		
Organization of the report	80	20			
Adequacy of the report as a technical reference on installation pollution surveys	40	20	40		

b. Response With Respect to Responsiveness and
Usefulness as a Technical Reference

Question	Response (%) Yes	No
Is this report responsive to your needs in the air pollution area?	80	20
Do you think you will use this report as a technical reference in the future for air pollution surveys?	80	20

Table 6

Technical Content Evaluation--
Installation Solid Waste Guidelines

Chapters	QUALITY PARAMETERS																	
	Presentation			Conciseness			Comprehensiveness			Practical Usefulness		Adequate Reference Material		Relates to Area of Interest		Responsive to Present or Future Needs	
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Yes	No	Yes	No	Yes	No	Yes	No
2 - "Waste Source Identification"	100			85	15		100			100		100		100		100	
3 - "Survey Guidelines"	71	29		71	29		57	43		85	15	71	29	85	15		
4 - "Data Acquisition"	100			85	15		100			100		100		71	29	85	15
5 - "Waste Disposal and Collection Systems Guidelines"	70	15	15	70	15	15	71	29		85	15	85	15	100		85	15
Appendix A - "Solid Waste Regulations and Regulatory Agencies"	85	15		85	15		100			83	15	85	15	100		100	
Appendix B - "Solid Waste Survey Protocol"	85	15		71	29		85	15		80	20	100		100		100	
Appendix C - "Solid Waste Factors for Selected Army Activities"	85	15		85	15		85	15		85	15	N.A.		100		100	

certain predetermined confidence interval. Many evaluators found the theory and application of these statistical techniques difficult to understand because of the mathematics involved, and because several typographical errors made the subject somewhat confusing. This conclusion is supported by the fact that even though users recommended less extensive coverage of the statistical techniques, they also suggested that nomographs, computer programs, and more illustrations and examples be provided to make sample size determination calculations relatively easy and straightforward.

Chapter 4 - Data Acquisition. The only improvement recommended for this chapter was to simplify the language to a level more compatible with the skills of the wage-grade employees who may actually be responsible for data acquisition.

Chapter 5 - Waste Disposal and Collection System Guidelines. The majority of users indicated that this chapter, which provided an overview of waste collection and disposal practices (sanitary landfills and incinerators) should either be excluded from the report altogether or addressed in another report. The users also indicated an urgent need for resource recovery and recycling guidelines.

Appendix A - Solid Waste Regulations and Regulatory Agencies. Most users found this appendix very useful, and many recommended more extensive coverage of this area, including the recently enacted legislative requirements. It was interesting to note that one person thought that this appendix would be especially useful in contracting out solid waste studies; however, another did not foresee much practical use for this information. Still another user observed that legislative requirements are constantly changing and therefore should be updated and made available to the installation personnel regularly.

Appendix B - Solid Waste Survey Protocol. The users found this appendix to be a very good example of a typical solid waste survey, but indicated that further expansion of the subject matter, including more examples, would be beneficial.

Appendix C - Solid Waste Emission Factors for Selected Army Activities. All users found the emission factors very useful. In fact, it was strongly recommended that coverage be expanded to include as many Army activities as possible.

Water/Wastewater Survey Guidelines

Four individuals from three installations evaluated this report. Table 7 summarized the information generated from the evaluation of

several chapters and the appendix of this report. All chapters of this report were rated "good" with respect to various quality parameters by 75 percent of the evaluators. Evaluators found that the information presented in these chapters was of practical usefulness, interesting, and fulfilling to their needs.

Chapter 2 - Survey Planning. The majority of users recommended that more examples and illustrations on how to use the survey planning flowcharts be provided.

Chapter 3 - Wastewater Mass Balance. It was recommended that more examples be included to facilitate understanding of the purpose and usage of wastewater mass balance.

Chapter 6 - Sampling Guidelines. It was recommended that examples be provided to simplify the understanding of the statistical portion of the sample scheduling section.

Chapter 7 - Flow Measurement. It was generally recommended that diagrams of flow measuring devices be provided.

Air Pollution Survey Guidelines for Army Installations

Five individuals from four installations evaluated this report. Table 8 summarizes the information generated from the evaluation of several chapters and the appendix of this report. All chapters were rated "good" with respect to presentation and conciseness by 80 percent of the evaluators; however, Chapter 2 and the appendix were rated only "fair" with respect to comprehensiveness by 60 percent and 40 percent of the evaluators, respectively. The remaining two chapters were rated "good" with respect to comprehensiveness by 80 percent of the evaluators. Otherwise, the evaluators generally found the information presented in these chapters to be useful, interesting, and responsive to their needs.

Chapter 2 - Emissions Inventory. This chapter was rated "fair" by 60 percent of the evaluators. Apparently, this chapter generated a great deal of interest among the users. In fact, some evaluators indicated that this report could serve as a desirable substitute for the EPA's *Compilation of Air Pollutant Emission Factors*,[1] which is designed

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[1] *Compilation of Air Pollutant Emission Factors*, AP-42 (U.S. Environmental Protection Agency, February 1976).

Table 7

Technical Content Evaluation--
Water/Wastewater Survey Guidelines

Chapter	QUALITY PARAMETERS															
	Presentation			Conciseness			Comprehensiveness			Practical Usefulness		Adequate Reference Material		Relates to Area of Interest		Responsive to Present or Future Needs	
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Yes	No	Yes	No	Yes	No	Yes	No
2 - "Survey Planning"	100			75	25		75	25		100		100		100		100	
3 - "Wastewater Mass Balance"	75	25		100			75	25		100		100		100		100	
4 - "Confined Waste Sources"	75	25		100			75	25		100		100		100		100	
5 - "Unconfined Waste Sources"	100			75	25		75	25		100		100		100		100	
6 - "Sampling Guidelines"	100			100			75	25		100		100		100		100	
7 - "Flow Measurement"	100			75	25		75	25		100		100		100		100	

Table 8

Technical Content Evaluation--
Air Pollution Survey Guidelines for Army Installations

Chapter	QUALITY PARAMETERS																	
	Presentation			Conciseness			Comprehensiveness			Practical Usefulness		Adequate Reference Material		Relates to Area of Interest		Responsive to Present or Future Needs	
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Yes	No	Yes	No	Yes	No	Yes	No
2 - "Emission Inventory"	80	20		80	20		40	60		100		100		100		100	
3 - "Air Pollution Dispersion"	80	20		80	20		80	20		80	20	100		100		60	40
4 - "Ambient Air Monitoring"	80	20		80	20		80	20		100		100		80	20	100	
Appendix - "Dispersion Model for a Point Source"	60	40		60	40		60	40		60	40	80	20	80	20	60	40

for general public use. Consequently, the users suggested that this chapter be revised to incorporate expanded coverage of pollution sources and activities found on a typical Army installation. A similar suggestion mentioned that EPA's AP-42 did not provide procedures for estimating particulates from construction, demolition, or training activities. Since this survey was conducted, however, more recent editions of EPA's AP-42 have been published which cover particulate emission factors from such activities as construction and demolition; nevertheless, typical Army activities such as training can only be covered in a report like CERL TR N-5.

Chapter 3 - Air Pollution Dispersion. Even though this chapter was rated "good" by 80 percent of the users, only 60 percent thought that the material was responsive to their needs. One user indicated that in his view the section on diffusion modeling provided good basic background information, but that it may not be used at the installation level because of the complexity of technical material, the understanding of which may require college-level chemistry and physics. Two other users suggested that this section of the chapter be eliminated and that the remaining parts be expanded with more illustrations and examples.

Chapter 4 - Ambient Air Monitoring. Even though this chapter was rated "good" by 80 percent of the evaluators, one thought that the material was useful only as background information and that installation personnel were unlikely to conduct complex air pollution surveys. This user felt that information on subjects like data-gathering networks and instrument siting might be more applicable to technical agencies such as the U.S. Army Environmental Hygiene Agency, which specializes in specific pollution surveys. On the other hand, other evaluators found the subject matter useful and adequately covered.

Appendix - Dispersion Model for a Point Source. Forty percent of the evaluators gave this appendix a rating of "fair," because they felt that the subject of a dispersion model for a point source is quite mathematical, and apparently much too complicated for the average installation employee. A majority of the users (60 percent) recommended that examples of calculations involved with such modeling be included to make the topic easier to understand.

3 SUMMARY

The results of this study are summarized as follows:

1. Army installations have exhibited a continuous need for air, water/wastewater, and solid waste surveys for the purpose of

   a. Evaluating current pollution management programs and pollution control facilities

   b. Acquiring background data to prepare preliminary studies for designing new pollution control programs and facilities

   c. Acquiring background data to prepare environmental impact statements and environmental reports required by various Federal, state, and local regulatory agencies.

2. The Sanitation Branch of an installation may not always be responsible for all pollution abatement programs of an installation. Some small installations do not even have a sanitation branch, and other large installations may have an environmental office in addition to a sanitation branch. But, whatever the organizational setup of the installation, the person responsible for all environmental programs of an installation is likely to possess adequate expertise in only one environmental area, i.e., air, water/wastewater, or solid waste. Furthermore, this person is more likely to be an expert in the water/wastewater area than in the two other areas. Consequently, only pollution surveys of an elementary nature are performed at the installation level. More extensive, complex surveys are performed by architect/engineer firms (or other consultants) on a contract basis, or by the U.S. Army Environmental Hygiene Agency. Even so, the need for a specific pollution survey must be recognized at the installation level; therefore, background data must be acquired as a basis for more extensive and complex surveys. For this reason, participants of this study expressed a great deal of interest in emission factors for typical Army activities. CERL has published a separate report on emission factors for many Army activities; however, emission factors have only limited use because they provide only a gross estimate and are not available for all Army activities.

3. Overall, the installation personnel participating in this study found all three survey guidelines to be very useful and responsive to their needs.

4. Study participants suggested several ways to make the guidelines more meaningful and suitable for use by installation personnel. A substantial number of these comments and questions dealt with differing

administrative and organizational procedures, mathematical errors, and typing mistakes. Many of these deficiencies can be corrected if subsequent editions of these reports are published. The following were the more substantive suggestions and recommendations:

a. Highly mathematical or technically advanced portions of these reports, such as the population size section of Chapter 3 of *Installation Solid Waste Survey Guidelines*, should either be deleted or greatly simplified with examples and illustrations

b. More illustrations and examples should be provided whenever possible

c. More extensive coverage was recommended for the following topics of each of the guidelines.

Installation Solid Waste Survey Guidelines

Chapter 5 - Waste Disposal and Collection

Appendix A - Solid Waste Regulations and Regulatory Agencies

Appendix C - Solid Waste Emission Factors for Selected Army Activities

Water/Wastewater Survey Guidelines

Chapter 7 - Flow Measurement

Air Pollution Survey Guidelines for Army Installations

Chapter 2 - Emissions Inventory

d. Although not within the scope of these guidelines, participants indicated a great need for resource recovery and recycling guidelines and for a regularly updated summary of environmental regulations applicable to Army installations.

4 CONCLUSIONS

The user evaluation of the waste characterization guidelines revealed that with respect to comprehensiveness, practicality, and Army relevance, the overwhelming rating ranged from "excellent" to "good." There were some general suggestions, however, of how the survey guidelines could be improved:

1. Simplify or eliminate the highly technical areas
2. Expand information and coverage of emission factors
3. Provide more detailed information on state pollution regulations
4. Provide more examples on principles presented in the guidelines
5. Provide more information on stream flow measurement
6. Provide more information on conducting air pollution emission inventories.

CITED REFERENCES

Compilation of Air Pollutant Emission Factors, AP-42 (U.S. Environmental Protection Agency, February 1976).

Schanche, G. W., and B. A. Donahue, *Air Pollution Survey Guidelines for Army Installations*, Technical Report N-5/ADA029633 (U.S. Army Construction Engineering Research Laboratory [CERL], July 1976).

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Schanche, G. W., L. A. Greep, and B. A. Donahue, *Installation Solid Waste Survey Guidelines*, Technical Report E-75/ADA018879 (CERL, October 1975).

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APPENDIX:

SAMPLE QUESTIONNAIRE

QUESTIONNAIRE
FOR
COMPREHENSIVE EVALUATION OF INSTALLATION
SOLID WASTE SURVEY GUIDELINES

NOTE: This is not a large scale survey. With only twelve respondents in total, CERL would appreciate a thorough evaluation of the report on your part. Please read the following instructions carefully before starting.

1. Complete this questionnaire soon after you are finished evaluating the report.

2. DO NOT OMIT ANY QUESTIONS. If a particular question is not applicable, or you can't answer it for some reason, please state so.

3. Respond with written comments where applicable. If more space is needed, record comments on separate sheet of paper identifying the question at the top of the sheet.

4. If any questions arise, please contact Bernard Donahue (217/352-6511, Extension 387; Chanute AUTOVON: 495-1110.

5. Please mail, within a month, the completed questionnaire, along with your marked copy of the report, to:

Department of the Army
Construction Engineering Research Laboratory
ATTN: Bernard Donahue, ENE
P.O. Box 4005
Champaign, IL 61820

1.0 GENERAL INFORMATION

1.1 Installation:_____

Location:_____

_____

1.2 Your Name:_____

Office Symbol:_____

Address:_____

_____

_____

Commercial Telephone Number:_____

FTS or AUTOVON Telephone Number:_____

Today's Date:_____

1.3 What is the installation's primary function?_____

_____

1.4 What is the approximate population of the installation (includes military as well as civilian personnel)?_____

2.0 ENVIRONMENTAL BACKGROUND INFORMATION

2.1 How many employees work in the sanitation branch (excluding clerks and secretaries)?_____

_____

2.2 How many employees have formal training or experience in solid waste management?_____

_____

2.3 What is your background in solid waste management?

Education:_____

Experience:_____

2.4 Which of the following solid waste facilities or operations are currently in effect at this installation?

Sanitary Landfill_____

Incinerator_____

Resource Recovery and Recycling_____

Other (please describe)_____

_____

2.5 Have any solid waste surveys been conducted at this installation in the past; or are there any proposals to conduct a solid waste survey in the near future?

_____yes _____no

2.6 If answer to 2.5 is "yes," please provide the date and purpose of each solid waste survey in the matrix below:

Purpose of Survey(s) / Dates of Survey(s)	To Prepare Environmental Reports			To Evaluate Current Solid Waste Management Programs				To Design New Solid Waste Management Programs			
	Environmental Impact Assessment or Statement	Regulatory Compliance Reports	Other (Please Specify)	Collection And Disposal Systems	Landfill And/Or Incinerator Systems	Resource Recovery and Recycling	Other (Please Specify)	Collection And Disposal Systems	Landfill And/Or Incineration Systems	Resource Recovery And Recycling	Other (Please Specify)

3.0 GUIDELINES EVALUATION

3.1 Please indicate below the amount of time you spent in reading the Installation Solid Waste Survey Guidelines.

0-4 hours_____

4-8 hours_____

8-12 hours_____

12-16 hours_____

16-20 hours_____

More than 20 hours_____

3.2 Was this time spent going through the report only once?_____, or more than once?_____.

3.3 If more than once, did you re-read the entire content of the report? _____, or only portions of it?_____.

3.4 If you re-read only portions of the report, please list them in the left column below, and indicate by checking the right column as to why these portions or areas were re-read. (You can list the portions either by chapter heading or sub-heading, or by page numbers.)

Chapter or Page Numbers	Difficult to Understand	Relates To Your Area Of Interest	Raised Unanswered Questions (Please Explain)	Other (Please Explain)

3.5 This question deals with specific technical areas of the report. Please provide your evaluation of each of the following technical areas by checking the correct response. Please note that you must provide an explanation where warranted.

3.5.1 Chapter 2--"Waste Source Identification" (pp. 12-28)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.2 Chapter 3--"Survey Guidelines" (pp. 28-30)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.3 Chapter 4--"Data Acquisition" (pp. 38-48)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.4 Chapter 5--"Waste Disposal And Collection System Guidelines"

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.5 Appendix A--"Solid Waste Regulations and Regulatory Agencies" (pp. 53-62)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.6 Appendix B--"Solid Waste Survey Protocol" (pp. 63-65)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.5.7 Appendix C--"Solid Waste Emission Factors for Selected Army Activities" (pp. 66-67)

(1) Presentation: Good____, Fair____, Poor____

(2) Conciseness: Good____, Fair____, Poor____

(3) Comprehensiveness: Good____, Fair____, Poor____

(4) Can you put this technical area to practical use?

Yes____, No____, Not Applicable____

(5) Adequate Reference Material:

Yes____, No____, Not Applicable____

(6) Relates to Your Area of Interest: Yes____ No____

(7) Useful to Your Present or Future Needs: Yes____ No____

(8) What changes do you recommend to improve this technical area?

More extensive coverage_____, explain:_____

_____

Less extensive coverage_____, explain:_____

_____

More illustrations and examples_____, explain:_____

_____

Other (please describe):_____

_____

_____

(9) Please state below if you have any questions or comments about this technical area:_____

_____

_____

_____

_____

3.6 This question concerns the overall quality of the report. Please rate the quality of each of the parameters in the table below on 1 to 5 scale where 1 is excellent and 5 is poor.

Quality Parameter	Rating				
	Excellent				Poor
Accomplishment of objectives stated in this report	1	2	3	4	5
Comprehensiveness of technical material	1	2	3	4	5
Clarity of technical material	1	2	3	4	5
Organization of the report	1	2	3	4	5
Adequacy of the report as a technical reference on installation solid waste survey guidelines	1	2	3	4	5

3.7 Is this report responsive to your needs in solid waste management area?

Yes_____ No_____

3.8 If not, please explain what your needs are and how this report can be made to fulfill those needs.

_____

_____

_____

_____

_____

3.9 Based on your past experience with solid waste surveys, do you think you will use this report as a technical reference in future for installation solid waste characterization?

Yes_____ No_____

Why not?_____

_____

_____

_____

3.10 Which portions of the report do you find most helpful and why?

_____

_____

_____

_____

3.11 Which portions of the report do you find least useful and why?

_____

_____

_____

_____

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Singh, Vinod V
User evaluation of CERL air, water / wastewater, and solid waste survey guidelines / by V. V. Singh, B. A. Donahue. - Champaign, IL : Construction Engineering Research Laboratory ; Springfield, VA : available from National Technical Information Service, 1978.
40 p. ; 27 cm. (Special report N-58).

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