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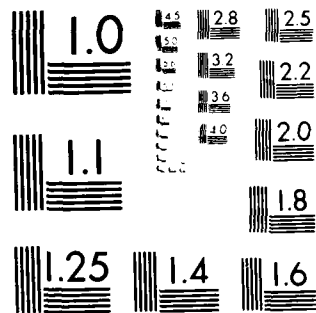
A STUDY OF WASTE MANAGEMENT WITHIN THE COL FLORENCE A
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CLINICAL INVESTIGATION ACTIVITY F.. J W TAYLOR AUG 81
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A Study of Waste Management
within the
COL Florence A. Blanchfield Army Community Hospital
Fort Campbell, Kentucky

A Problem Solving Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree
of
Master of Hospital Administration

by

Major James W. Taylor, Jr., MSC

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TABLE OF CONTENTS

	Page
LIST OF ILLUSTRATIONS.	v
LIST OF TABLES	vi
CHAPTER I. INTRODUCTION.	1
Conditions Which Prompted the Study.	2
Statement of the Problem	3
Purpose of the Study	3
Assumptions.	3
Limitations.	4
Objectives	5
Evaluation Criteria.	5
Literature Review.	6
Waste Management	6
Infections Control	12
Research Methodology	18
FOOTNOTES.	20
CHAPTER II. DISCUSSION	23
Survey of Concerns	23
Current Facility Data Baseline	25
Waste Volume Data.	27
Outpatient Activity.	30
Inpatient Activity	34
Nosocomial Infections.	37
Community of Interest Data Baseline.	37
Future Facility Data Baseline.	42
Consensus Process.	44
FOOTNOTES.	53
CHAPTER III. SUMMARY AND CONCLUSIONS	54
Summary.	54
Conclusions.	58
CHAPTER IV. RECOMMENDATIONS.	60

	Page
APPENDIXES	
APPENDIX A - GLOSSARY OF TERMS.	62
APPENDIX B - CENTER FOR DISEASE CONTROL (CDC) CLASSIFICATION OF ETIOLOGIC AGENTS.	65
APPENDIX C - MEMORANDUM FOR RECORD CONTAMINATED WASTE HANDLING IN HOSPITALS.	71
APPENDIX D - MEMORANDUM FOR RECORD STATE CONTAMINATED WASTE STANDARDS (KENTUCKY)	73
APPENDIX E - SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS . . .	75
APPENDIX F - CONTAMINATED WASTE/INFECTIOUS CONTROL SURVEY INSTRUMENT	77
APPENDIX G - CONSENSUS SURVEY	83
APPENDIX H - ANALYSIS SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS.	90
APPENDIX I - WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)	93
APPENDIX J - WEIGHT ANALYSIS.	95
APPENDIX K - INPATIENT DAYS SUMMARY	97
APPENDIX L - NOSOCOMIAL INFECTION STATISTICS.	99
APPENDIX M - MEMORANDUM FOR RECORD HEALTH FACILITY STUDY.	101
APPENDIX N - RESPONSES TO CONTAMINATED WASTE/INFECTIONS CONTROL SURVEY QUESTION II-D	104
APPENDIX O - ANALYSIS OF NARRATIVE RESPONSE QUESTIONS FROM THE CONTAMINATED WASTE/INFECTIONS CONTROL SURVEY	121
APPENDIX P - DIAGRAM OF TYPICAL PNEUMATIC TUBE ROOM	126
APPENDIX Q - PNEUMATIC TUBE ROOM.	128
APPENDIX R - TYPICAL FLOOR ARRANGEMENT COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL.	130

	Page
APPENDIX S - WASTE MANAGEMENT SERVICE AREA.	132
APPENDIX T - CONSENSUS SURVEY RESULTS	135
APPENDIX U - FC MEDDAC REGULATION	138
SELECTED BIBLIOGRAPHY.	147

LIST OF ILLUSTRATIONS

Figure	Page
1. Hospital Waste Ecosystem.	8
2. Nosocomial Infection Causation Factors.	13

LIST OF TABLES

Table	Page
1. Hospital Waste Components	10
2. Waste Reutilization.	10
3. Survey Hospital Sizing	11
4. Disease State Risk Factors	14
5. Concerns Survey Participants	24
6. Ranking of Contaminate Waste Management Concerns	26
7. Sources of Contaminated Waste Generation	28
8. Weekly Volume of Waste (Weekends Excluded) Bags of Contaminated Waste - Summary	29
9. Clinic Visits.	31
10. Outpatient Contaminated Waste Analysis	32
11. Aggregate Outpatient Trend Analysis.	33
12. Patient Days - Summary	12
13. Aggregate Inpatient Trend Analysis	36
14. Master Survey Distribution	39
15. Sources of Contamination Waste Generation.	43
16. Soiled Utility Areas - COL Florence A. Blanchfield Army Community Hospital	45
17. Pneumatic Chute Sites.	46
18. Consensus Evaluation Criteria.	48
19. Materials To Be Excluded From the Pneumatic Tube System. . .	50

CHAPTER I

INTRODUCTION

The cantonment hospital system of the United States Army was created as a rapid response to the needs of uniformed services beneficiaries who required health care in the 1940's. The facilities constructed in this era are equally well known to both health care beneficiaries and providers alike. They are recognized by each group as facilities which have served the United States Army well in the past. As time and technology have advanced they have been most difficult, if at all possible, to upgrade to the state of the art which modern health care providers require in order to deliver 1980's medical practice.

The United States Army Community Hospital, Fort Campbell, Kentucky is such a cantonment facility. It was constructed during 1942 and continues to provide health care services in 1981. Wherever economically, environmentally, or medically mandated, modernization has occurred. However, the structure and its age severely limit the capability to provide state of the art medical care in the 1980's.

The Congress of the United States authorized construction of a new hospital for Fort Campbell in Fiscal Year 1976. Construction began in the fall of 1977 on the hospital destined to be the first named for an Army nurse, the COL Florence A. Blanchfield Army Community Hospital. It has progressed to the point that the new facility is in excess of 91 per cent of completion as of April 1981.¹ The date currently projected for actual care to commence from the new hospital is October 1982.²

Conditions Which Prompted the Study

As an organization faces beneficial occupancy of any newly constructed facility, management must fully mature each conceptual operating subsystem. This maturation must involve not only personnel, equipment and governing body approval, but also application procedures for each operating subsystem. The various systems expected to be fully operational with the COL Florence A. Blanchfield Army Community Hospital equally require such maturation. One such subsystem needing full development is the contaminated waste handling system.

The concept of contaminated waste handling has been approached in the transition plan for the new hospital. The concept maturation has not taken place to the point that an operating system for waste management is available. This was discovered as a result of a review of contaminated waste handling in the operating room within the present facility. This project mandated the survey of future operating plans. There did not appear to be a plan for management of hospital generated waste within the COL Florence A. Blanchfield Army Community Hospital.

Without procedures for proper handling of hospital generated waste, the waste may provide the source for nosocomial or hospital acquired infections impacting upon both patient and staff. Such a situation can also promote community infection outbreaks.

The potential impact of the waste management problem is so widespread due to the infection potential remaining with all biological wastes generated within the health care facility. It is for this reason that professional standards organizations such as the Joint Commission on Accreditation of Hospitals pay such strict attention to infection control within hospitals.³

As may already be noted, this subject is fraught with unique terminology. The terms having greatest use in the field are found with their definitions in a glossary at Appendix A.

Statement of the Problem

Given the aforementioned conditions, the problem is to determine a system for contaminated waste handling with the COL Florence A. Blanchfield Army Community Hospital, Fort Campbell, Kentucky.

Purpose of the Study

The purpose of this study is to analyze the concerns of key United States Army Community Hospital staff members regarding the contaminated waste handling program within the COL Florence A. Blanchfield Army Community Hospital, Fort Campbell, Kentucky and to determine the system which will best support medical care within the new facility.

Assumptions

A number of assumptions must be made relative to the subject of the study. It is assumed no additional change orders may be accepted for the COL Florence A. Blanchfield Army Community Hospital thus promoting the timely completion of the construction in July 1982.

It is assumed that the Infection Control Standards contained within the 1981 Edition of the Accreditation Manual for Hospitals will be unchanged. Thus the framework of concern around which a system may be constructed will remain unchanged.

It is assumed that continued use of contract personnel for handling contaminated waste will be authorized and remain economically feasible. Hence, the use of military personnel for this task will remain minimal.

Contaminated waste is assumed to be generated within inpatient areas of the hospital complex in a similar manner during both weekend and week day periods. The per patient day basis of waste generation is assumed to be reasonably constant during weekends.

The contaminated and general waste is assumed to be picked up during weekend and holiday periods in accordance with the contract specifications.

Limitations

Records regarding the volume of contaminated waste generated within treatment and diagnostic areas of the US Army Community Hospital are nonexistent. Thus a baseline of hospital generated waste is not available. Changes of waste collection sites were made during the data collection period, thus somewhat altering the information trends.

Since housekeeping personnel are not scheduled to be in place during weekend and holiday periods, contaminated waste data could not be accurately collected during these periods.

Access to individual areas of concern within the construction complex of the COL Florence A. Blanchfield Army Community Hospital is severely limited due to construction site guidelines issued by the Office of The Surgeon General/ Corps of Engineers.⁴ This will essentially preclude touring the facility by key informants or delphi panel members.

Objectives

Objectives of this study include defining the nature of contaminated waste to be generated in the COL Florence A. Blanchfield Army Community Hospital. They include collecting data regarding contaminated waste disposal within the US Army Community Hospital and conducting an analysis of such information. This analysis will result in a determination as to the volume of waste generated per inpatient as well as principal outpatient care areas. The various alternative procedures for handling hospital waste within the new hospital will be discussed.

Evaluation Criteria

The criteria against which alternatives will be measured include the following. Those procedures developed should be consistent with infection control standards of the Joint Commission on Accreditation of Hospitals. The procedures should not mandate the utilization of US Army personnel to a degree greater than in the current system. The procedures should be consistent with waste handling requirements of applicable federal and state environmental protection agencies. The system for contaminated waste handling should be such that endorsement by the US Army Community Hospital Infections Control Committee could be forthcoming. The procedures adopted should not result in an increase in nosocomial infections above the presently existing annual rate. There should be no waste build up in patient care areas such that waste would require corridor storage.

Literature Review

A review of the body of literature available on the subject was made. The materials appeared to revolve around three not completely self-contained subject areas. These areas were waste management, infections control and regulatory or professional review. A brief synopsis of the materials reviewed follows.

Waste Management

Hospitals have become increasingly concerned with the bodily insult patients are subjected to as a result of contracting hospital acquired infections. This concern has manifested itself in a movement from a medical product which can be recycled such as the glass syringe to a completely disposable medical product such as the plastic syringe. Through an attempt to reduce the incidence of nosocomial infection caused by contaminated equipment, disposability has become a normal state of affairs.⁵ With this movement toward disposability has come an increase in the role of plastics in hospital wastes as compared to other institutional wastes.⁶

Hospital waste is composed of a wide variety of materials. These include the dressings and bandages used in the care of surgical and trauma patients. Disposable supplies (thermometer covers) and equipment (suture removal kits) as well as pathological waste are involved in this waste category. The patients' personal refuse along with food waste must be considered in this category. Waste from the operating theatre, as well as administrator's refuse such as office paper, is also involved.^{7,8} One can readily see that hospital waste

is anything but a homogeneous grouping of materials. It involves materials from as diverse a cross section of areas as any institution could possibly suggest.

With such a diversity in composition, it is little wonder that there is difficulty in achieving a consensus as to standards for data collection on which to construct a comparison data base. Few hospitals were noted to have a data management system which could reliably provide information on which to base waste management decisions.⁹ This difficulty is aggravated when coupled with the variety of waste management indicators utilized such as pounds per bed, pounds per bed patient, pounds per gross population, or pounds per patient day.¹⁰ These complimentary factors illustrate why the management of hospital waste is often a neglected subject area.¹¹

Lack of uniformity in waste collection practices has aggravated this problem of neglect. Hospitals have placed great reliance upon isolation standards and procedures for high risk areas of the facility such as hepatitis isolation areas, etc. While little doubt exists that fomites and other materials from a low census area will be carefully dealt with, the pressure felt by nursing staff due to increased census and decreased staffing create the potential for placement of these materials in general waste disposal bins. Thus, the general waste from a high risk area can become the potential instrument of transmission for a pathogenic microorganism.¹² Neglect of such problems could lead to transference of the pathogenic microorganisms into the community and creation of a trans-community health hazard. This hazard being worsened in those communities where land fill operations do not strictly comply with state regulatory standards for immediate cover over with earth.¹³

The interrelationships between the community within which the hospital operates and the health care facility itself are clearly illustrated by Engley in his diagrammatic example.

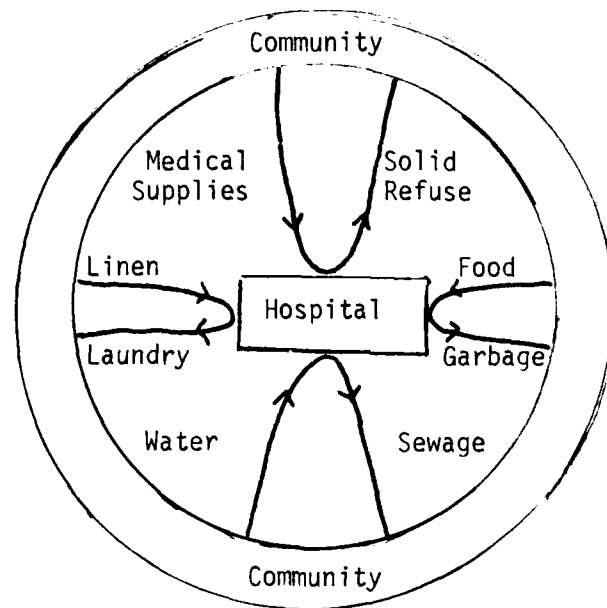


Fig. 1.--Hospital Waste Ecosystem

Source: Adapted from Frank B. Engley, Jr., "Biological Relationships," *Hospitals*, Vol 46, N. 20 (October 16, 1972), p. 85.

As we consider the individual staff involvement in the conversion of the inflowing material into the outflowing waste, this illustration provides a study in variations.

The various staff elements involved in the conversion teamed with the individuals' varying levels of education create the fabric for the variety of potential contamination of waste effluent.

Any hospital's process to deal with its waste effluent should accomplish certain functions. These include the following.

1. Collections of medical waste from the points of generation and movement to some central location for staging. The central location is normally within the hospital complex.
2. Treatment in some form of the staged medical waste upon the hospital premises.
3. Removal of the staged medical waste from the hospital premises via transportation assets.
4. Final processing and ultimate disposal of generated medical waste.¹⁴

In order to be effective, waste management procedures were suggested to require the possession of certain characteristics. These characteristics included the following.

1. Simplicity
2. Noiselessness
3. Hygiene
4. Economic Feasibility
5. Ability to tolerate misuse¹⁵

Medical waste bagging at the site of generation was generally an accepted practice noted in the literature reviewed. Some variations were noted in the specifics of bagging procedures or requirements. The use of a series of paper (impervious) bags of various colors (up to five) was noted by one author.¹⁶

Double bagging of materials in impervious bags was discussed by the Center for Disease Control¹⁷ and others.¹⁸ A variety of guidelines for medical waste handling to prevent spread of contagious materials was noted to be in use despite a lack of rigorous evaluation of these guidelines.^{19,20} These guidelines include double bagging, red tagging, incineration or autoclaving of medical wastes.

The volume of medical waste generated was reported by various authors. A study of 224 patients in twenty-nine hospitals conducted during the late 1950's suggested results shown in Table 1.

TABLE 1
HOSPITAL WASTE COMPONENTS

Type of Waste	Daily Average Weight Per Patient (lb)
Garbage	3.28
Non-Combustible	1.10
Combustible	2.61
Surgical	0.11
Autopsy	0.03
Total	7.13 ²¹

One three year study of a West Virginia medical center pointed out that the following daily volume was generated from its 438 bed hospital

TABLE 2
WASTE REUTILIZATION

Disposable Waste	3,300 lbs.
Reusable Waste*	9,630 lbs.*
Total	12,930 lbs.

*includes laundry processed items

This study further suggested that there were 8.2 pounds of disposable waste generated daily per inpatient (402 beds occupied) along with 24.0 pounds of reusable waste.²² Another study involving thirty-two Southern California hospitals was reported upon. These hospitals were sized as follows.

TABLE 3
SURVEY HOSPITAL SIZING

Size (Beds)	Number
Fewer than 100	7
Between 100-199	9
Between 200-299	8
Between 300-399	6
Greater than 400	2

The average aggregate waste reported from this study group was 10.25 pounds per patient day including 0.38 pounds of infectious waste. This same study found that safe segregation and collection of contaminated waste were possible as long as administration can accept increased handling costs. Another significant finding suggested the size of the facility had little effect upon the weight of infectious waste per patient day while drastically changing the total number of pounds of waste per patient day.²³ Considering the volume of waste removed from hospitals, it was noted that utmost reliance must be placed upon the housekeeping staff for timely collection and movement to staging sites.²⁴ Anything less would dictate a massive use of personnel whose principal duty must be to other tasks which would suffer by this diversion to housekeeping tasks.

A variety of methods was described which would improve the efficiency and perhaps the effectiveness of waste collection personnel in the task of waste removal. The use of mechanical dumb waiters or conveyors was discussed.²⁵ The use of trash chutes was also reviewed along with their attendant problems of cleanliness^{26,27} and fire hazard.²⁸

The Commonwealth of Kentucky was noted to have surveyed 97 hospitals generating hazardous waste. It found that for a variety of reasons a significant number of those hospitals (22.7 per cent) was reported to have unsatisfactory methods for disposal.²⁹ These unsatisfactory methods were such that the health of the supported population might be compromised.

Infections Control

The literature is replete with a variety of statements regarding the nosocomial infection rate which various hospitals report. One study reported the infection rate could run as high as 19 per cent for a 12 month period.³⁰ While another study of a Veterans Administration Hospital indicated a range of hospital acquired infection rates from 17.5 per cent down to 7.6 per cent.³¹ Dixon of the Center for Disease Control stated that at least five per cent of all acute care hospital patients in the United States acquire infections while within the facility³² whether symptoms present themselves prior to discharge or not.

The nosocomial infection rate experienced within health care facilities is the result of an interaction of a number of interrelated factors. They may

be diagrammatically shown by the following illustration.

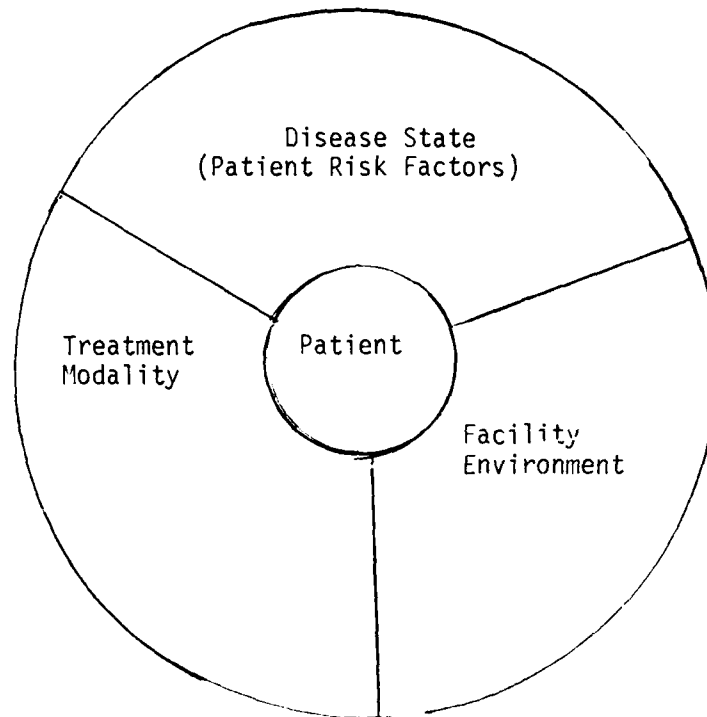


Fig. 2.--Nosocomial Infection Causation Factors

The individual hospital's nosocomial infection rate is substantially effected by the same factors indicated above. Many of these factors are not directly influenced by the facility. The patients underlying disease state is a major determinant of the probability of nosocomial infection acquisition. The relative risk is shown in Table 4. This disease state may be categorized based

upon the elapsed time before onset of death signs or symptoms.

TABLE 4
DISEASE STATE RISK FACTORS

Category	Relative Risk ³³
Rapidly Fatal Illness	+++
Ultimately Fatal Illness	++
Non Fatal Illness	+

The treatment received by many patients to combat the applicable disease process is often contributory to the infection potential of the patient. The diagnostic and therapeutic procedures principally impacting upon this involve the use of immunosuppressive agents, ionizing radiation, intravenous chemotherapy and catheterization.³⁴ By far the greatest impactor upon the clinical results of microbial contamination of those actions mentioned is the treatment of patients with immunosuppressive drugs.³⁵

The environment in which the patient encounter takes place completes the triad of agents which influence the health care facility's nosocomial infection rate. A wide variety of microorganisms is likely to be found within the hospital which has responsibility for treatment of the complete spectrum of patient conditions prevalent in today's society.³⁶ To effectively counter the potential influence of these possibly virulent microorganisms, the facility must take specific steps designed to ameliorate the microbial insult to patients' health.

These actions include.

1. Establishment of effective procedures to deal with bactericidal cleaning of environmental surfaces, equipment and other materials. These procedures must also deal with removal of medical wastes on a timely basis.³⁷

2. Conduct of training for all members of the hospital staff. This includes everyone who deals with medical waste management from practitioner to housekeeping staff. The training must be initiated upon employment but repeated for reinforcement on a periodic basis.³⁸

3. Scheduling environmental sanitation procedures on a basis which prevents building of waste materials as well as prevents growth of pathogenic microbial populations within patient care units.³⁹

4. Monitoring the compliance with procedures, training and scheduling standards established within the facility.⁴⁰

The microbiological environment within a hospital was discussed with a variety of sources reviewed including Eickhoff, Norris and Young as well as Cundy and Bell. The most comprehensive source was Gordon et al who researched medical waste disposal containing pathogenic organisms. The Center for Disease Control classification of pathogenic agents was discussed by Gordon et al. This classification of microorganisms is on the basis of hazard regarding communicability. The classes are shown below.

Class	Definitions
1	Agents of no or minimal hazard to human ... health.
2	Agents of ordinary potential hazard. This class includes agents which may produce disease of varying degrees of severity from ... cutaneous penetration but which are contained by ordinary laboratory techniques.

- 3 Agents involving special hazard ... which includes pathogens which require special conditions for containment.
- 4 Agents that require the most stringent conditions for their containment because they are extremely hazardous to laboratory personnel or may cause serious epidemic disease.
- 5 Foreign animal pathogens that are excluded from the United States by law or whose entry is restricted by USDA administrative policy.⁴¹

A specific catalogue of pathogenic agents is provided at Appendix B. This listing represents bacterial, fungal, parasitic, viral and rickettsial agents which the Center for Disease Control has classified as to pathogenicity. Many have been reported to be present in health care facilities and thus of concern to contaminated waste management planners.

Regulatory or Professional Review

Within the health care industry, it was noted that specific guidelines did exist for management of waste within the health care facility. The Sanitation Standard of the Joint Commission on Accreditation of Hospitals which suggests that "a clean environment is essential in eliminating health hazards"⁴² provides definitive guidance regarding waste classification as well as their handling in "impervious containers."⁴³ The Department of the Army is no less definitive in its guidelines.

A Fact Sheet from the US Army Environmental Hygiene Agency which thoroughly reviewed the categories of hospital waste and provided a précis on its handling. Special note was made of the definition of infectious waste which limited its components to waste from isolation rooms, respiratory isolation rooms, microbiology laboratory waste and surgical waste "at the discretion of the operating

room supervisor."⁴⁴ Incineration of such infectious waste was mandated prior to removal from the hospital environment. It was further noted that these wastes would be added to the Environmental Protection Agency definition of Hazardous Waste.⁴⁵

The specific guidelines under which hospital waste will fall has been subject to considerable vacillation within the Environmental Protection Agency and related agencies tasked with public health protection. The phase II regulations implementing portions of the Resource Conservation and Recovery Act of 1976 were to be promulgated during the latter part of the calendar year 1980⁴⁶ but due to vigorous debate and implementation concerns, they have not been published as of May 1981. Appendix C indicates the impact which this has regarding the United States Army contaminated waste management program.

Uncertainty as to definition within the Environmental Protection Agency has impact upon individual states such as the Commonwealth of Kentucky. Kentucky has recognized that safe handling and management of solid wastes including contaminated waste is a significant problem and one which many facilities have not handled in the most appropriate manner.⁴⁷ It is for this reason that the Kentucky State Health Plan requires a written program outlining the facilities' procedure to safely handle and store infectious (hazardous) waste.⁴⁸ The State of Tennessee defines hazardous waste in such a way as to include infectious materials generated within hospitals as they may "cause .. an increase in mortality or an increase in serious irreversible or incapacitating ... illness ... when improperly treated, stored, disposed of."⁴⁹

The American Hospital Association was noted to be following the development of Environmental Protection Agency regulations very carefully. The association identified the concern which many health managers feel has not been adequately dealt with. The Association urged the Environmental Protection Agency to construct regulations which balance the protection of the environment and public health with practicality and reasonableness. It urged that the regulations be written to deal with actual risks to society rather than perceived risks.⁵⁰

Research Methodology

The approach taken for this study was one on which a variety of data gathering methodologies were employed. These methodologies included key informant survey, facility data base development, community of interest survey, directed study and delphi technique.

An important preliminary step was the development of a conceptual basis for establishment of a contaminated waste program. This included a survey of the basic literature in the fields of industrial and hospital specific waste management. This literature survey was augmented by visitation and evaluation of area health care waste management programs operant within both area medical centers as well as community hospitals.

The crucial concerns of key hospital staff members regarding the program to be practiced within the COL Florence A. Blanchfield Army Community Hospital was gained through a key informant survey. This survey employed the written

survey instrument shown at Appendix E.

Upon analysis of general areas of concern, a baseline of information regarding current facility operations was required. These data included contaminated waste generation patterns, patient encounter patterns (inpatient and outpatient) as well as nosocomial infection experiences operant within the United States Army Community Hospital.

Selected data were requested from hospitals within a community of interest. This data included questions regarding philosophy, quantification data (workload, contaminated waste generated, infection rates), and assessment data. This survey, along with its administrative instructions, is provided at Appendix F.

The results of this survey were analyzed and suggested additional study of literature applicable to this subject.

The results of the preceding steps were provided to a select group of participants representing a broad grouping of persons each of whom had a responsible role in dealing with contaminated waste. The group was asked to study the collected material and evaluate their feelings about opinion subjects and future trends upon occupancy of the COL Florence A. Blanchfield Army Community Hospital. The survey instrument which was utilized is shown with its administrative instructions at Appendix G. This delphi technique application provided the basis for a draft regulation for management of hospital generated contaminated waste.

FOOTNOTES

- ¹New Hospital Project Meeting, U.S. Army Community Hospital, April 15, 1981.
- ²LTC Martin Sargent, Project Officer, COL Florence A. Blanchfield Army Hospital, Fort Campbell, Kentucky, Interview held February 25, 1981.
- ³Accreditation Manual for Hospitals. Chicago: 1979
- ⁴LTC Martin Sargent, Interview, December 3, 1980.
- ⁵Margaretta A. Hammond, "Refuse Disposal - 1978," Nursing Times, (December 7, 1978), 8.
- ⁶Walter E. Williams, "Hospital Engineering," Hospitals, Vol. 47 (April 1, 1973), 93.
- ⁷P. J. Barlow, "Hospital Waste Disposal," Environmental Health, (March, 1972), 74.
- ⁸Frances S. Norris and B. G. Young, "Guidelines for Defining and Disposing of Medical Waste," Aviation, Space and Environmental Medicine, (January, 1978), 83.
- ⁹Jiya L. Jain, Sant R. Arora and Richard G. Bond, "Integrated Approach Eliminates Waste," Hospitals, Vol. 46 (October 16, 1972), 82.
- ¹⁰L. P. Wallace, R. Zaltzman, and J. C. Burchinal, "Where Solid Waste Comes From; Where It Should Go," Modern Hospital, Vol. 118 (February, 1972), 94.
- ¹¹Jain, "Integrated Approach Eliminates Waste," 105.
- ¹²Norris, "Guidelines for Defining and Disposing of Medical Waste," 82.
- ¹³Frank B. Engley, Jr., "Biological Interrelationships," Hospitals, Vol. 46 (October 16, 1972), 89.
- ¹⁴Jain, "Integrated Approach Eliminates Waste," 107.
- ¹⁵Barlow, "Hospital Waste Disposal," 76.
- ¹⁶*Ibid.*, 75.

¹⁷United States Public Health Service, Center for Disease Control, Guidelines From The Center For Disease Control - Safe Disposal of Solid Wastes From Hospitals, June, 1980, 2.

¹⁸Richard G. Bond, George S. Michaelson, and Roger L. DeRoos, Environmental Health and Safety in Health-Care Facilities, (New York: Macmillan Publishing Co., Inc., 1973), p. 268.

¹⁹Elizabeth Barrett-Conner, et al., Epidemiology for the Infection Control Nurse, (Saint Louis: The C. V. Mosby Company, 1978), p. 190.

²⁰William Schaffner, "Infection Control: Time to Justify the Costs," Hospitals, Vol. 53 (April 1, 1979), 125.

²¹Public Administration Service, Municipal Refuse Disposal, prepared by Institute for Solid Wastes, 1970, 230.

²²Wallace, "Solid Waste," 92.

²³"When Is Infectious Waste Not Infectious Waste?" Hospitals, Vol. 46 (May 1, 1972), 65.

²⁴Margaretta A. Hammond, "Refuse Disposal," 9.

²⁵American Hospital Association, Infection Control in the Hospital, Chicago: 1979.

²⁶Herman Koren, Environmental Health and Safety, (New York: Pergamon Press, Inc., 1974), p. 129.

²⁷Eugene L. Pollock, "Use of One-Time Materials and Equipment Increases Hospital Refuse," Solid Wastes Management, Vol. 21 (October, 1978), 100.

²⁸American Hospital Association, p. 78.

²⁹Kentucky State Health Plan, September, 1980, p. V-B-3.

³⁰Norris, "Guidelines for Defining and Disposing of Medical Waste," 82.

³¹Gladys Chelgren and Marc F. LaForce, "Limited, Periodic Surveillance Proves Practical and Effective," Hospitals, Vol. 52 (March 16, 1978), 152.

³²Richard E. Dixon, "Nosocomial Infection, A Continuing Problem," Postgraduate Medicine, Vol. 62 (August, 1977), 95.

³³Schaffner, "Infection Control," 126.

³⁴Theodore C. Eickhoff, "Hospital Infections," Disease-A-Month, (September, 1972), 9.

³⁵E. J. L. Lowbury, et al, Control of Hospital Infection, (New York: John Wiley and Sons, 1975), p. 4

³⁶Ibid., p. 3

³⁷Ernest E. Laundsby, "Infection Control: Does Your Program Measure Up?" Executive Housekeeper, (June, 1979), 9.

³⁸Lowbury, Control of Hospital Infection, p. 7

³⁹Laundsby, "Infection Control," 9.

⁴⁰Ibid., 9.

⁴¹Judith G. Gordon, et al, Disposal of Hospital Wastes Containing Pathogenic Organisms, (McLean, Virginia: The Mitre Corporation, 1979), p. 160.

⁴²Accreditation Manual for Hospitals, p. 48.

⁴³Ibid., p. 49.

⁴⁴United States Army Health Services Command, Fact Sheet on Hospital Wastes, HSC Commanders Conference, (Fort Sam Houston, Texas, 1980), 1.

⁴⁵United States Army Health Services Command, "Hospital Wastes," (Fort Sam Houston, Texas, January, 1981), 2.

⁴⁶"Hazardous Waste Regulations," Federal Register, Vol. 45, (November 24, 1980), 77873.

⁴⁷Kentucky State Health Plan, p. V-B-12.

⁴⁸Ibid., p. V-B-15.

⁴⁹Tennessee Solid Waste Disposal Control Board, Emergency Rules Governing Hazardous Waste Management in Tennessee, (October 31, 1980), .01-3.

⁵⁰American Hospital Association, "EPA Hazardous Waste Regulations Update Summary and Recommendations," Letter to Institutional Members, (Chicago: January 1981), 2.

CHAPTER II

DISCUSSION

The waste management practices utilized within a health care facility are not limited to impacting upon the patients undergoing treatment within its confines. They have the potential to adversely affect the staff of the facility who may move from the hospital environment to the community on a daily basis. It is for this reason that the federal government includes the hospital's wastes in its definition of hazardous wastes.¹ The contaminated waste management program to be utilized within a new facility is of substantial concern to many segments of a hospital staff. Their concerns must be elucidated in order to protect not only patients, but also staff from the debilitating effects of infection.

Survey of Concerns

A survey was conducted for the purpose of identifying contaminated waste management concerns during the data collecting portion of the research process. The categories of participants were selected such that they represented a broad yet relevant cross section of health professionals. The particular individuals were selected based upon possessing maturity within their individual specialty and also longitudinal experience serving the Fort Campbell beneficiary population with its unique characteristics. A summary of the participants is provided in Table 5.

TABLE 5

CONCERNS SURVEY PARTICIPANTS

<u>Organizational Category</u>	<u>Number</u>
Department of Medicine	1
Department of Nursing	2
Department of Surgery	1
Housekeeping	1
Preventive Medicine	2
	<u>7</u>
<u>Individual Category</u>	<u>Number</u>
Administrator	2
Nurse	3
Physician	2
	<u>7</u>

The individuals selected to participate in this survey were asked to list their concerns for the COL Florence A. Blanchfield Army Community Hospital regarding contaminated waste management. They were not restricted as to the area of concern that they should express. They were not structured by headings or examples. They were asked for free association concerns that they felt relevant to the new hospital's operation. A complete listing of concerns which were identified is provided at Appendix H. The participants were asked to rank order the concerns such that the participant's greatest concern would be given a ranking of one, while a tenth priority concern would be given a ranking of ten. The rankings of individual concerns were entered into a matrix of priorities. The aggregate level of importance as to each concern was determined by summing the products of the individual priority and the number of persons who felt the concern had the same level of importance. A weighted level of concern was achieved regarding each issue by dividing this aggregate concern by the total number of individuals indicating any concern at all regarding the issue. The resultant quotients were then rank ordered by level of importance. The lowest numerical value indicates the highest level of concern. The concerns having mean levels of concern of five or less are identified in Table 6. The primary issues developed by the survey participants revolved around five issues. The issues were (1) contaminated waste definition, (2) separation of waste using this contaminated waste definition, (3) storage of such waste and (4) waste movement routes within the facility.

Current Facility Data Baseline

In order to properly plan for the management of contaminated waste, a thorough understanding must be had of the nature of medical practice by

TABLE 6
RANKING OF CONTAMINATED WASTE MANAGEMENT CONCERNS

<u>Concern</u>	<u>Number of Responses</u>	<u>Mean Concern</u>
Contaminated waste definition	5	1.8
Cleaning trash chutes	2	3.0
Separation of waste by categories and independent system operation	4	3.5
Training of waste generators and handlers	5	3.6
Proper packaging of waste (double bagging)	5	3.8
Security of waste chutes (prevention of abuse)	2	4.0
Container staging (sufficiency)	2	4.5
Decontamination of waste	2	4.5
Storage of waste (intermediate) with category mix-up or pilferage	3	4.7

the Fort Campbell medical community. This will be accomplished by collecting a variety of data relating to medical care provided within the US Army Community Hospital.

Waste Volume Data

The quantity of contaminated waste generated within the facility would provide an index as to the magnitude of the potential problem if it were not effectively dealt with. Records did not exist for review and analysis. The Executive Housekeeper and the contractor's representative supported the collection of statistics as to the number of bags of waste collected from generation sites. The data was gathered on a daily basis during the period 20 October through 27 February 1981. The sites of waste generation are shown in Table 7.

The weekly volume of waste by waste generation site is shown at Appendix I. It will be noted that the aggregate number of bags of waste collected ranged from a high of 1,361 bags for the Operating Room to a low of 7 bags for the Immunization Clinic. The total volume for the entire hospital for the period was 4,055 bags. The average daily number of bags of contaminated waste for the entire hospital was 43, while the Operating Room generated 14. The summary of this data is shown in Table 8.

The bags collected were noted to be relatively consistent in terms of fullness, while they varied as to weight. The total weight of contaminated waste collected within the hospital was compared with the total number of bags during the same time period to determine the mean weight. The hospital produced 25,153.75 pounds of contaminated waste. The weekly mean bag weight varied from 5.04 to 8.92 pounds. The 19-week average was 6.20 pounds per bag. The analysis resulting in these statistics is provided at Appendix J.

TABLE 7

SOURCES OF CONTAMINATED WASTE GENERATION

1. Cast Room (Orthopedics Clinic)
2. Dental Clinic
3. Dermatology Clinic
4. Eagle Clinic
5. Emergency Clinic
6. Immunization Clinic
7. Inpatient Pharmacy
8. Intensive Care Ward
9. Labor and Delivery Ward
10. Laboratory
11. Maternity Ward
12. Medical Clinic
13. Medical/Surgical (Female) Ward
14. Medical/Surgical (Male) Ward
15. Midwife Clinic
16. Newborn Nursery
17. Obstetrics-Gynecology Clinic
18. Operating Room
19. Orthopedics Ward
20. Otolaryngology (ENT) Clinic
21. Pediatric Clinic
22. Pediatric Ward
23. Physical Therapy Clinic
24. Respiratory Therapy Clinic
25. General Surgery Clinic
26. Urology Clinic
27. Well Baby Clinic

TABLE 8

WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)

BAGS OF CONTAMINATED WASTE - SUMMARY

<u>Activity</u>	<u>Bldg/Ward</u>	<u>Total Bags</u>	<u>Period^A Average</u>	<u>Daily Average</u>
Labor and Delivery	122A/1A	780	41	8
Maternity	122B/1B	172	9	2
Newborn Nursery	124A/2A	103	5	1
Midwife Clinic	124B/2B	80	4	1
OB-GYN Clinic	126B/3B	90	5	1
Pediatric Ward	134A/7A	222	12	2
Intensive Care Ward	134C/7C	128	7	1
Respiratory Therapy	134D/7D	17	1	1 (B)
Orthopedic Ward	136B/8B	23	1	1 (B)
Cast Room	140B/10B	16	1	1 (B)
Med/Surg (Male)	140D/10D	113	6	1
Med/Surg (Female)	142C/11C	68	4	1
Med/Surg (Female)	142D/11D	31	2	1 (B)
Emergency Clinic	146A/13A	226	12	2
General Surgery Clinic	148A/14A	108	6	1
Urology Clinic	148B/14B	43	2	1 (B)
Eagle Clinic	148C/14C	79	4	1
Physical Therapy Clinic	148D/14D	67	4	1
Inpatient Pharmacy	125A/18A	9	1 (B)	1 (B)
Medical Clinic	147A/25A	16	1	1 (B)
Immunization Clinic	147B/25B	7	1 (B)	1 (B)
Well Baby Clinic	149A/26A	62	3	1
Dermatology Clinic	149B/26B	41	2	1 (B)
Pediatric Clinic	149C/26C	59	3	1
Pediatric Clinic	149D/26D	42	2	1 (B)
Laboratory	118/NA	61	3	1
Hospital Dental Clinic	118/NA	17	1	1 (B)
Operating Room	119/NA	1,361	72	14
ENT Clinic	118/NA	14	1	1 (B)
Total Bags		<u>4,055</u>	<u>213</u>	<u>43</u>

NOTE: A - Period consists of 5 days
 B - Result less than 0.5 rounded to one

Outpatient Activity

In order to distinguish between the waste generated as a result of ambulatory patient care and care for the in-house patient, segregated workload data was required to be collected. The outpatient activity for each of the clinical activities which generated contaminated waste was extracted from the Uniform Chart of Account records maintained by the hospital. These were needed in order to ultimately provide prediction information. The information collected is shown in Table 9.

The outpatient workload was compared with the records of contaminated waste generated within the ambulatory patient care centers during the same period of time. This comparison resulted in a display showing wide variance in waste-to-workload ratios. This suggests a variance in operating definition as to what materials necessitate disposal as contaminated waste. An example of this is provided by the Eagle Clinic, which operates only during the afternoons for division physicians and physician's assistants as a general outpatient clinic. This clinic's ratio of waste per patient was 0.2248 pounds/clinic visit. The General Surgery Clinic, which would be expected to have a high ratio due to the number of incision and drainage procedures performed, as well as iodoform gauze changes done,² had a ratio of only 0.1902 pounds/clinic visit. A complete display of these comparisons is found in Table 10.

Due to the variance in data noted earlier, the aggregate level of clinic activity was felt to be more useful for predicting contaminated waste levels. The aggregate ambulatory workload was subjected to linear regression analysis, along with the weight of waste for corresponding periods of time (see Table 11). The resulting equation for predicting the

TABLE 9
CLINIC VISITS

<u>Activity</u>	<u>Bldg/Ward</u>	<u>Oct^A</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>
Midwife Clinic	124B/2B	865	1,294	1,550	1,433	2,014
OB-GYN Clinic	126B/3AB	1,081	1,521	3,892	1,425	1,637
Respiratory Therapy Clinic	134D/7D	133	498	545	344	369
Cast Room	140B/10B	356	623	793	826	814
Emergency Clinic	146A/13A	1,959	3,829	3,681	4,399	4,569
General Surgery Clinic	148A/14A	515	719	813	742	734
Urology Clinic	148B/14B	174	262	257	326	365
Eagle Clinic	148C/14C	212	396	361	633	577
Physical Therapy Clinic	148D/14D	1,397	1,761	1,743	1,940	2,608
Medical Clinic	147A/25A	521	889	1,070	1,090	1,119
Immunization Clinic	147B/25B	2,077	4,431	2,982	3,490	3,457
Well Baby Clinic	149A/26A	230	388	371	439	385
Dermatology Clinic	149B/26B	394	645	747	842	772
Pediatric Clinic	149CD/26CD	1,797	2,796	3,438	4,386	4,253
ENT Clinic	118/NA	284	383	477	456	376
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Aggregate		11,995	20,435	22,720	22,771	24,049

NOTE: A - 20 Oct - 31 Oct only

TABLE 10
 OUTPATIENT CONTAMINATED WASTE ANALYSIS

<u>Activity</u>	<u>Clinic Visits Period Total</u>	<u>Total Volume Collected (Bags)</u>	<u>Total^A Weight Collected (LB)</u>	<u>Volume Per Clinic Visit (Bags)</u>	<u>Weight Per Clinic Visit (LB)</u>
Midwife Clinic	7,156	80	496	.01	.07
OB-GYN Clinic	9,556	90	558	.01	.06
Respiratory Therapy Clinic	1,889	17	195	.01 ^B	.06
Cast Room	3,412	16	99	.01	.03
Emergency Clinic	18,437	226	1,401	.01	.08
General Surgery Clinic	3,523	108	670	.03	.19
Urology Clinic	1,384	43	267	.03	.19
Eagle Clinic	2,179	79	490	.04	.22
Physical Therapy Clinic	9,449	67	415	.01	.04
Medical Clinic	4,689	16	99	.01 ^B	.02
Immunization Clinic	16,437	7	43	.01 ^B	.01 ^B
Well Baby Clinic	1,813	62	384	.03	.21
Dermatology Clinic	3,400	41	254	.01	.07
Pediatric Clinic	16,670	101	626	.01	.04
ENT Clinic	1,976	14	87	.01	.04
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Aggregate	101,970	967	5,995	.01	.06 (.05879)

NOTE: A - Based on mean weight of 6.2 pounds/bag
 B - Result less than .005 rounded to .01

TABLE 11

AGGREGATE OUTPATIENT TREND ANALYSIS

	<u>Outpatient Visits (X)</u>	<u>Total Contaminated Waste (Weight) Collected (LBS) (Y)</u>	<u>Average Waste Per Outpatient Visit</u>
Oct	11,995 ^A	522 ^A	0.0435
Nov	20,435	1,125	0.0551
Dec	22,720	1,497	0.0659
Jan	22,771	1,379	0.0606
Feb	24,049	1,472	0.0612
Period	101,970	5,995	0.0588

Prediction Equation: $Y = .0822 (X) - 476.4946$

Correlation Coefficient = 0.9858

Standard Deviation = 406

NOTE: A - 20 Oct thru 31 Oct only

waste generated by the medical staff as care is provided to the Fort Campbell community is as follows.

Total waste generated (pounds) = 0.0822 (outpatient visits) - 476.4946.

Upon investigation, it was found that the programmed outpatient workload for the COL Florence A. Blanchfield Army Community Hospital's clinics previously mentioned is 831 average daily clinic visits.³ The volume of contaminated waste predicted to be generated incident to this level of workload is 1,572 pounds per month.

Inpatient Activity

The contaminated waste generation pattern as a result of inpatient health care, was discerned through a similar collection of data. The number of patient days experienced within each inpatient ward was gathered by evaluating daily inpatient nursing reports. The reports provided the unit census as of midnight, as well as the census 24 hours later. These data were averaged and suggested the mean patient days experienced on each waste generating unit. These patient days were accumulated and displayed as a five day total. These five day totals were consistent with waste collection data discussed earlier. The complete patient days experience is provided at Appendix K. The information is summarized in Table 12.

The accumulated patient days experienced within the facility was analyzed using linear regression as it was associated with waste generated during the same time period. This analysis is shown in Table 13. The prediction equation resulting from the analysis is as follows.

Total waste generated (pounds) = 1.6190 (inpatient days) - 1087.6627.

TABLE 12
PATIENT DAYS - SUMMARY

<u>Activity</u>	<u>Bldg/Ward</u>	<u>Total Patient Days</u>	<u>Period Avg. Patient Days</u>	<u>Daily Avg. Patient Days</u>
Labor and Delivery	122A/1A	1,334.0	70.2	14.0
Maternity	122B/1B	A	A	A
Newborn Nursery	124A/2A	1,189.0	62.6	12.5
Pediatric Ward	134A/7A	554.5	29.2	5.8
Intensive Care Ward	134C/7C	373.0	19.6	3.9
Orthopedic Ward	136B/8B	2,097.0	110.4	22.1
Med/Surg (Male)	140D/10D	2,408.0	126.7	25.3
Med/Surg (Female)	142C/11C	1,598.5	84.1	16.8
Med/Surg (Female)	142D/11D	B	B	B
Total Patient Days		<u>9,554.0</u>	<u>502.8</u>	<u>100.6</u>

NOTE: A - DATA COLLECTED AGGREGATED WITH 122A/1A
B - DATA COLLECTED AGGREGATED WITH 142C/10C

TABLE 13
AGGREGATE INPATIENT TREND ANALYSIS

	<u>Outpatient Visits (X)</u>	<u>Total Contaminated Waste (Weight) Collected (LBS) (Y)</u>	<u>Average Waste Per Patient Day</u>
Oct	1,039.0A	614A	0.5910
Nov	1,920.0	1,600	0.8333
Dec	1,876.5	2,293	1.2220
Jan	2,384.0	2,878	1.2072
Feb	2,334.5	2,653	1.1364
Period	9,554.0	10,038	1.0507

Prediction Equation: $Y = 1.619 (X) - 1087.6627$

Correlation Coefficient = 0.9532

Standard Deviation = 917

NOTE: A - 20 Oct thru 31 Oct only

The new facility is expected to experience 2,543 patient days per month as adjusted for patient consistency, based upon program workload. The volume of contaminated waste resulting from that level of activity could be expected to be 3,030 pounds per month.

Nosocomial Infections

The US Army Community Hospital has an enviable record regarding hospital acquired infections. Experience for calendar year 1980 revealed that 2.1% of the 7,036 patients discharged had acquired an infection which was not present at the time of admission. The first calendar quarter experience was somewhat higher. It revealed that 2.15% of the 2,097 patients discharged had acquired an infection. Greater detail regarding the infection experience of the currently utilized facility is provided at Appendix L. These statistics, less than half the national average, are extremely favorable when compared with many other uniformed service facilities.⁵ The facility does not rely upon documented discharge diagnoses to identify a case as an acquired infection. Discharge diagnosis documentation has been noted to present problems due to personal physician reluctance to record such infections in some cases.⁶

Community of Interest Data Baseline

The experience of other facilities, both military and civilian, were felt to be necessary in order to avoid pitfalls in program development. Careful consideration of other health care facilities was made in order to select appropriate survey participants. Factors such as facility size, population supported, staffing patterns and geographic proximity were evaluated before the final selection was made. This process is documented in appendix M. The final list of facilities selected to participate in a

Contaminated Waste/Infections Control Survey are shown in Table 14. Six civilian hospitals responded out of the six hospitals sent the survey. Of the nine military facilities asked to respond, eight returned completed survey instruments. The overall rate of return of the surveys was 93.3%.

The responses to the Contaminated Waste/Infections Control Survey are contained in Appendix N. The hospitals indicated that they were fairly split as to whether civilian contracted personnel or logistics personnel were responsible for movement of waste out of nursing units. Only one facility indicated responsibility for this resided with the nursing staff. In all but one case, did these persons responsible for waste movement receive periodic infection control inservice training. This was provided on the average of once every five and one-half months.

Most institutions (51.2%) placed contaminated waste in red-colored plastic bags for movement. Yellow plastic bags were used by 21.4% of the respondents and 14.3% used clear plastic bags. Only one respondent noted the use of black plastic bags for contaminated waste control.

When asked to respond to what quantity of contaminated waste was generated daily within the respondent's facility, it was obvious that such information was not readily available. This is true regardless of the potential impacts of the Resource Conservation and Recovery Act for small quantity generators.⁷ It may be that most facilities have accepted the statement that the majority of a hospital's solid waste is no more hazardous than typical residential waste and may be handled with no special precautions.⁸

TABLE 14
 MASTER SURVEY DISTRIBUTION

<u>FACILITY</u>		<u>LOCATION</u>
	Military	
Darnall Army Hospital		Fort Hood, TX
Ireland Army Hospital		Fort Knox, KY
Irwin Army Hospital		Fort Riley, KS
Leonard Wood Army Hospital		Fort Leonard Wood, MO
Martin Army Hospital		Fort Benning, GA
Moncrief Army Hospital		Fort Jackson, SC
Reynolds Army Hospital		Fort Sill, OK
Silas B. Hays Army Hospital		Fort Ord, CA
Womack Army Hospital		Fort Bragg, NC
	Civilian	
Clarksville Memorial Hospital		Clarksville, TN
Grayson County Hospital		Leitchfield, KY
Jennie Stuart Memorial Hospital		Hopkinsville, KY
Medical Center of Hopkins County		Madisonville, KY
Vanderbilt University Medical Center		Nashville, TN
Veterans Administration Medical Center		Nashville, TN

An average of thirty-eight bags of contaminated waste was generated on a daily basis within the four facilities responding. A slightly larger number of facilities (six) responded in terms of the weight of such waste on a daily basis. They stated that three hundred fifty-one pounds of such waste was produced on a daily basis.

Thirty-six percent of the facilities (five) did not collect information upon which a statement as to contaminated/general waste percentages could be made. Within those facilities responding, the percentage of waste noted to be contaminated or infectious ranged from 2.0% to 35.0%. The mean percentage within the nine facilities supplying a response was 13.3%. The Executive Housekeeper at the US Army Community Hospital was asked to provide an estimate of this facility's comparative proportions. It was estimated that 20% of the waste removed by custodial personnel was handled as contaminated.⁹ The volume of waste appears somewhat high in comparison to the mean values submitted by the surveyed facilities.

The nosocomial infection rates reported by the fourteen responding facilities ranged from an abnormally low 0.19% to a high of 4.17% of all patients discharged. The facility with the highest rate was 0.83% below the previously noted national average of 5.00%. On the basis of the annual discharge history (8,228) for the high rate facility, it experienced 68 fewer infections than would have been expected. The sample aggregate rate of infection was noted to be 2.14% during the calendar year 1980. Had the national average for infections been operant, the surveyed facilities would have experienced 4,108 additional infections during the period when taken as a whole. The experience of the US Army Community Hospital has been quite consistent with the surveyed hospitals and this low rate indicates active

involvement and concern about infection control by all significant segments of the hospital's staff as is noted to be necessary for significant reduction in infection rate.¹⁰

The bed occupancy of the hospitals surveyed indicated an average of one hundred eighty-nine beds were occupied on a daily basis. The facilities' occupancies ranged from fifty-eight to four-hundred twenty-six beds occupied on a daily basis. The US Army Community Hospital's experience is somewhat less (100.6) as viewed by equivalent patients hospitalized. The community rate is compared with the average operating or licensed capacity of two hundred eighty-four beds within the hospitals surveyed.

It was noted that only one facility had operational pneumatic trash chutes. In one sense, this is unexpected as literature indicated them to be most effective in waste handling,¹¹ as well as conservation of manpower.¹² It was noted that some hospital administrators were concerned with problems associated with the use of pneumatic tube systems. These problems include noise during operation which is due to hard items bouncing against the tube walls, as well as maintenance difficulties¹³ often due to overstuffing or improper securing of waste transfer bags.¹⁴ More than half of the facilities surveyed (57.1%) were noted to make use of trash compaction devices during their waste removal cycle.

Responses to four of the questions on the Contaminated Waste/Infection Control Survey were narrative rather than quantitative in nature. These responses could not be subjected to standard statistical analysis techniques. Each response was carefully evaluated for key words or key phrases which were repetitively used in a variety of the hospital's answers. There were twenty-two words or phrases that warranted further analysis. The

results of the analysis of questions I-A, I-B, III-B and III-D are found in Appendix O.

The definition of contaminated waste appeared to consistently use terms such as "laboratory waste," "excreta," "surgical waste," "body fluids," "exudates and blood," and "infectious or communicable." Additionally, the definition included the terms "potentially or suspected," "secretions" and "specimens."

Nosocomial infection definitions used by the surveyed hospitals included terms such as not present or incubating, develops during hospitalization and after admission.

There were so few responses to the question concerning problems in maintenance, cleaning or obstruction of tubes, that an analysis of frequently occurring terms was felt to provide little useful information. The same question regarding problems in compactor use resulted in the use of phrases such as cleaning, not closing the door and inappropriate items.

Future Facility Data Baseline

In order to better relate the information regarding the currently used facility to the COL Florence A. Blanchfield Army Community Hospital, a review of the new facility information was accomplished through use of available facility literature.

There was a need to review the new facility blueprints in order to determine which areas would generate contaminated waste. A listing of the functional areas of the two hundred forty-one bed, four building complex will elucidate the areas which will have the potential for generating such waste within the new facility. Such a listing is provided within Table 15. There are no radical changes in the nature of generation sites as compared with the currently utilized facility.

TABLE 15
 SOURCES OF CONTAMINATION WASTE GENERATION
 COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

<u>Building</u>	<u>Level</u>	<u>Functional Areas</u>
Building A	Level 0	No patient treatment areas
	Level 1	No patient treatment areas
	Level 2	Nursery Post Partum Patient Care Unit Psychiatric Patient Care Unit
	Level 3	Pediatric Patient Care Unit Medical Patient Care Unit Presently undesignated patient care unit
	Level 4	Surgical Patient Care Unit Orthopedic Patient Care Unit
	Level 5	No patient treatment areas
Building B	Level 1	Central Materiel Service Morgue Brace Shop Inpatient Pharmacy
	Level 2	Operating Suite Labor and Delivery Suite Intensive Care Units Radiology Laboratory Physical Therapy Clinic Hospital Dental Clinic Urology Clinic Primary Care Clinic Emergency Clinic
Building C	Level 2	Orthopedic Clinic/Podiatry Clinic Pediatric Clinic Obstetrics/Gynecology Clinic Physical Examination Section
	Level 3	Otolaryngology Clinic/Ophthalmology Clinic General Surgery Clinic Medical Clinic Medical Specialty Clinic

The areas of generation of contaminated waste have storage rooms for the storage of such waste. They are enumerated within Table 16. The rooms will be equipped much as the Kentucky Hospital Construction criteria requires.¹⁵ That is to say, they shall contain a clinical sink, work counter, waste and soiled linen receptacles. There is limited floor space within these areas. Within one room on each floor, there will be a pneumatic tube station to accommodate soiled linen and waste. The pneumatic tube rooms are configured as shown in Table 17. A typical pneumatic tube room is shown at Appendix Q. The special arrangement of the soiled utility rooms and the pneumatic tube room on a typical floor in the "A" building is shown in Appendix R. As is readily shown, the location of these waste management rooms is such that the entire floor has only one centrally located tube site, but also two reasonably sited utility rooms.

The pneumatic waste tube empties into a collection hopper in the service courtyard on the lower level of Building B. The hopper is contained above the site of a waste compactor which has yet to be installed. The waste management area is physically separated from the service entrance of the building where food stuffs and medical materiel are delivered. These areas are shown in Appendix S, both photographically as well as diagrammatically.

Consensus Process

The same categorical grouping of staff was utilized to select individuals to receive selected information and then to evaluate questions contained in the consensus survey instrument. The persons were selected based upon the level of personal experience as well as the degree of positional authority possessed.

TABLE 16

SOILED UTILITY AREAS

COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

<u>Building</u>	<u>Level</u>	<u>Room No.</u>	<u>Size (FT)</u>	<u>Area Designation</u>
A	0	None	NA	NA
A	1	None	NA	NA
A	2	2AB02	6 1/2 X 4	Newborn Nursery
A	2	2AB41	4 1/2 X 4	Post Partum
A	3	3AB17	6 X 4	Undesignated
A	3	3AB34	6 X 4	Medical
A	4	4AB16	6 X 4	Surgical
A	4	4AB31	6 X 4	Orthopedic
B	1	None	NA	NA
B	2	2BA17	5 1/2 X 4	Recovery Room
B	2	2BB62	6 1/2 X 4	Emergency Clinic
B	2	2BD07	4 1/2 X 3	Orthopedics
B	2	2BC23	9 X 8	Operating Room
B	2	2BD42	5 X 2	Radiology
B	2	2BG06	7 1/2 X 4	Intensive Care Unit
B	2	2BF15	8 1/2 X 4	Labor and Delivery
B	2	2BJ09	4 1/2 X 2	Coronary Care Unit
B	2	2BJ11	6 1/2 X 4	Labor and Delivery
C	2	2CA17	6 1/2 X 3 1/2	Radiology
C	2	2CC29	5 X 3	Physical Exam Section
C	2	2CF09	6 1/2 X 2 1/2	OB-GYN area corridor
C	2	2CJ10	7 X 4	Pediatrics
C	2	2CH23	6 1/2 X 4	OB-GYN
C	3	3CC01	6 1/2 X 4 1/2	Ophthalmology
C	3	3CC15	6 1/2 X 3	General Surgery
C	3	3CJ08	6 1/2 X 4	Medicine
C	3	3CH18	6 1/2 X 4	Medicine

TABLE 17

PNEUMATIC CHUTE SITES

COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

<u>Building</u>	<u>Level</u>	<u>Room No.</u>	<u>Area Designation</u>
A	0	None	NA
A	1	None	NA
A	2	2AB20	Obstetrics
A	3	3AB24	Medical
A	4	4AB20	Surgical
B	2	2BC03	Intensive Care
B	2	2BC23	Operating Suite
B	2	2BF15	Labor and Delivery
B	2	2BJ09	Coronary Care Unit
C	2	2CF09	OB-GYN area corridor

The survey participants were provided with summarized portions of the Contaminated/Infectious Waste Survey, US Army Community waste volume information, Center for Disease Control Disposal Guidelines regarding hospital solid waste and nosocomial infections statistics.

Criteria were established in order to evaluate the consensus survey response. They are contained in Table 18. The results of the survey are contained in Appendix T. A summary of the principal issue agreed upon is contained in the following paragraphs.

The definition of contaminated waste to be used in the new facility was to include all disposable materials from the care and treatment of all septic outpatients and inpatients, as well as selected disposable materials from all other patient rooms regardless of whether one is considering inpatients or outpatients. The selected disposables included needles, soiled dressings and other materials. Generally, any material soiled with human by-products.

It was generally felt that the nosocomial infection rate within the new facility would decrease upon occupancy despite a possible temporary increase in the first six months. This was shown by analyzing the pattern of disagreement, as well as the pattern of agreement as shown below.

<u>Response Category</u>	<u>Number of Responses</u>
Agreement	
Decrease	6
Undecided	2
Increase	1
Disagreement	
Decrease	21
Undecided	5
Increase	27

TABLE 18

CONSENSUS EVALUATION CRITERIA

Questions With Undecided Opinion Stated

With one undecided opinion	Consensus is four or greater in agreement
With two undecided opinions	Consensus is three or greater in agreement
With three undecided opinions	Consensus is three or greater in agreement
With four undecided opinions	Consensus is two or greater in agreement
With five undecided opinions	Consensus is two in agreement
With six undecided opinions	Consensus is not possible

Questions Without Undecided Opinion Stated

Consensus is achieved when four or greater are in agreement

The strength of agreement as to nosocomial infection rate change was not so pronounced. The consensus appeared to reside with the proposition that the rate will decrease, but less than 1.0%.

The volume of contaminated waste to be generated within the new facility was expected to increase. There was less strength to this opinion than there was regarding nosocomial infection rate change. This was indicated by analyzing the agreements as well as the disagreements. These patterns are shown below.

<u>Response Category</u>	<u>Number of Responses</u>
Agreement	
Decrease	2
Undecided	3
Increase	3
Disagreement	
Decrease	26
Undecided	4
Increase	24

The materials agreed upon for placement within the pneumatic tube system were singled out to be administrative waste (refuse). The materials felt most strongly to be excluded from the tube system are shown in Table 19. Administrative waste was shown in the exclusion listing only because it was associated with other materials. These other materials were strongly discouraged for disposal in the pneumatic tube and this discouragement carried over when these items were linked with administrative waste.

The tube system was felt to require locking in order to preclude the use of the system to discard inappropriate materials. It was felt that the system should be operated by logistics or housekeeping personnel on a timely basis. This would require action by these persons on a schedule

TABLE 19

MATERIALS TO BE EXCLUDED FROM THE PNEUMATIC TUBE SYSTEM

<u>Strength of Opinion</u>	<u>Material</u>
7	Food Waste (Garbage) Food and Infectious Materials Food and Sharps
6	Infectious Waste (Contaminated) Including Pathologic Waste Administrative and Food Administrative and Infectious Infectious and Sharps
5	Administrative and Sharps
4	Sharps

designed to prevent a build-up of waste. The group felt that the waste should be removed on first shift and third shift. There was less agreement in terms of third shift. The highest associated score for disagreement remained with groupings having only one common denominator and that was second shift. In a similar manner, the highest associated score for agreement remained with groupings having first shift as a common linkage.

The future was felt to be one which would see an increase in the concerns expressed regarding health care contaminated waste management. This group opinion is consistent with the American Hospital Association's view of the future.¹⁶

The group agreed that liquid waste such as urine, feces, vomitus, blood or other body fluids may be disposed of through the use of the sanitary sewer system. At the same time, it was felt that all solid wastes should be containerized at the point of generation. The contaminated waste included in this classification was felt to require double bagging using red exterior bags.

The anatomically distinct materials, including fetuses, were felt to require handling by the Department of Pathology. This conclusion referred to terminal handling as opposed to the initiation of specimens within patient care and treatment areas.

Policies and procedures adopted for use within the COL Florence A. Blanchfield Army Community Hospital will be required to embrace the concerns and consensus opinions stated earlier. The policies and procedures must not be overly complex, otherwise misapplication would ensue. The process adopted must not omit consideration of the individual nature of the employee operating within the framework of the procedure. The

procedures must be able to tolerate intentional or inadvertent misuse. Development of meaningful policies and procedures will be measured in the final analysis by the patient undergoing hospitalization without blemish caused by unsightly and potentially infectious waste management practices.

FOOTNOTES

¹U.S. Environmental Protection Agency, Hazardous Waste Generation and Commercial Hazardous Waste Management Capacity - An Assessment, SW No. 894, (Washington, D.C.: Government Printing Office, 1980), p. III-3.

²Major Douglas H. McConnell, M.D., General Surgery Service, US Army Community Hospital, Fort Campbell, Kentucky, Interview, March 12, 1981.

³Sylvia Trevino, Program Analysis, US Army Health Services Command, Fort Sam Houston, Texas, Interview, April 6, 1981.

⁴Ibid.

⁵CAPT (USN) Betty A. Meriwether, Chief, Professional Services, US Army Community Hospital, Fort Campbell, Kentucky, Interview, February 10, 1981.

⁶Jonathan Freeman and John E. McGowan, Jr., "Risk Factors for Nosocomial Infection," Journal of Infectious Diseases, Vol. 138 (December 1978), p. 818.

⁷"Hazardous Waste Management System: General," Federal Register, Vol. 45, May 19, 1980, p. 33120.

⁸U.S. Public Health Service, Center for Disease Control, Guidelines From the Center for Disease Control - Safe Disposal of Solid Waste From Hospitals, (Atlanta, GA: Government Printing Office, 1980), p. 1.

⁹Richard P. Mumford, Executive Housekeeper, US Army Community Hospital, Fort Campbell, Kentucky, Interview, April 22, 1981.

¹⁰William Schaffner, "Infections Control: Time to Justify the Costs," Hospitals, Vol. 53 (April 1, 1979), p. 130.

¹¹American Hospital Association, Infection Control in the Hospital, (Chicago: AHA, 1979), p. 78.

¹²Eugene L. Pollock, "Use of One-Time Materials and Equipment Increase Hospital Refuse," Solid Wastes Management, Vol. 21 (October 1978), p. 100.

¹³Memorandum For Record, "Regional Medical Center of Hopkins County," February 20, 1981.

¹⁴Pollock, Solid Wastes Management, p. 100.

¹⁵Kentucky Department for Human Resources, Hospital Facilities - Construction and Alteration, 902 KAR 20:010, (Frankfort, KY: 1980), p. 7.

¹⁶American Hospital Association Letter "EPA Hazardous Waste Regulations Update Summary and Recommendations," January 1981.

CHAPTER III

SUMMARY AND CONCLUSIONS

Due to the nature of the subject investigated as well as the survey information gathered during the research process, a brief encapsulation of the findings is mandated.

Summary

The concerns identified by informed members of the community hospital staff revolved around five principal issues.

1. Contaminated waste definition
2. Separation of waste using a consistent definition
3. Storage of such waste
4. Proper packaging of such waste
5. Waste movement routes within the facility

The volume of contaminated waste generated as a result of patient care within the US Army Community Hospital amounted to an average of 43 bags on a daily basis. This was equivalent to 267 pounds of such waste on a daily basis. This waste was the result of 1,085 average daily outpatient encounters and 100.6 average daily patient days.

The volume of contaminated waste was predicted for the new facility using the available US Army Health Services Command Workload programmed for Fiscal Year 1982. It was determined that 1,572 pounds of such waste would be generated

monthly due to outpatient care. Inpatient care would generate 3,030 pounds of such waste on a monthly basis. The aggregate volume would be further increased as a result of the operating room and the laboratory waste generation practices. The amount of this increase would depend largely upon the "discretion of the operating room supervisor" as well as the proportionate share of patients admitted for surgery as opposed to nonsurgical care.

The nosocomial infection experience of the US Army Community Hospital during the last fifteen months indicate an infection rate of 2.11% to be in existence.

The majority of hospitals surveyed utilized contractual or logistics employees in the movement of contaminated waste placed in red colored plastic bags. Many hospitals did not have information readily available regarding the volume of such waste generated within their facilities.

Very few of the hospitals surveyed made use of pneumatic trash chutes due to problems of noise and maintenance. More than half of the facilities surveyed made use of trash compactors in the processing of contaminated waste. Concerns regarding compactor use include the following:

1. Cleaning
2. Not closing the door after use
3. Compaction of inappropriate items

The definition of contaminated waste utilized by the hospitals surveyed was found to include the most frequently occurring terms shown below:

1. Laboratory waste
2. Excreta

3. Surgical waste
4. Body fluids
5. Exudates
6. Blood
7. Infections/communicable
8. Potentially/suspected
9. Secretions
10. Specimens

The definition of nosocomial infections was found to include the following terms:

1. Not present or incubating
2. Develops during hospitalization
3. After admission

There will be an adequate number of waste storage rooms in the new facility, however, they will be extremely limited as to available floor space. The pneumatic tube stations are centrally located in the nursing tower of Building A and reasonably available within Buildings B and C.

The consensus definition of contaminated waste to be used within the new facility included the following:

1. All disposable materials from the care and treatment of all septic outpatients and inpatients
2. Selected disposable materials from all other patient encounters including needles, soiled dressings, and other materials soiled with human by-products.

The nosocomial infection rate would decrease upon occupancy of the new hospital despite an initial increase during the first six months due to use of new systems and new operating procedures. This decrease would be less than 1.0%.

The volume of contaminated waste generated was expected to increase upon occupancy of the new facility.

The pneumatic tube was felt best utilized in the transportation of administrative refuse. This waste includes general packaging materials, papers, useless documents, outdated administrative documents and other nonpathogenic/nonequipment refuse. These items require bagging at the site of generation to reduce the probability of clogging the tube system. The tube system should be locked and operated by specially trained housekeeping personnel on a timely basis. The disposal of trash should take place during the first and third shifts.

The future will be fraught with increased concerns regarding contaminated waste management. Liquid wastes such as urine, feces, vomitus, blood or other body liquids may be disposed of through use of the sanitary sewer system.

Solid contaminated wastes should be containerized at the point of generation. Red plastic bags should be utilized. Nylon filament tape may be used to secure the bags.

Anatomically distinct materials should be disposed of by pathology personnel due to the potential sensitivity of such material.

Conclusions

Upon evaluation of the findings, the following conclusions are offered.

1. Contaminated waste management is not the sole responsibility of any single staff element.
2. Contaminated waste policies and practices must keep pace with the level of concern voiced by competent representatives of the organizations charged with protection of the public's health.
3. Levels of concern regarding contaminated waste management within hospitals will increase as regulations are published which will implement the Resource Conservation and Recovery Act of 1976.
4. There should be an ongoing methodology for reassessing the contaminated waste management practices directed within any health facility.
5. There should be a formalized linkage between the Housekeeping Department and the Department of Nursing, so that contaminated waste procedures may be coordinated.
6. Policies and procedures for contaminated waste management should address the concerns identified within the summary.
7. The hospital should appoint a coordinator to maintain contaminated waste data such as indicated earlier. This will facilitate the changes which may be directed if hospital wastes are fully integrated with federal hazardous waste management definitions.
8. Waste can be properly segregated at the generation sites through use of appropriately colored impervious plastic bags.

9. Contaminated waste may be burned using the new hospital incinerator as it is scheduled to comply with all existing air emission standards.

10. General waste may be safely disposed of using the land fill located at Fort Campbell in compliance with existing Tennessee pollution abatement regulations.

CHAPTER IV

RECOMMENDATIONS

In view of the conclusions presented above, the following recommendations are offered.

1. The Executive Housekeeper should meet with the Nursing Standardization Committee in order to establish uniform waste management guidelines for application within the COL Florence A. Blanchfield Army Community Hospital.

2. The hospital should appoint the Executive Housekeeper as the hospital coordinator for contaminated waste management data collection.

3. The responsibility of overseeing the hospital's waste management should be assigned to a standing committee or to an ad hoc committee. This committee should have representatives from Housekeeping, Nursing, Preventive Medicine and Administration. The Executive Housekeeper should be given priority consideration.

4. Modification of the custodial contract should be made such that increased pick up of contaminated waste as well as management of general refuse will be facilitated.

5. The hospital training coordinator in conjunction with Nursing Education and Training should develop and implement an intensive training program for current and future employees. This training program should deal with waste

definition, segregation criteria, handling procedures, as well as proper double bagging techniques. This program should be made available to personnel in both nursing and housekeeping departments. There should be a semiannual update/ refresher course made available to personnel assigned to these departments.

6. The Preventive Medicine Activity should carefully review the future Federal Register editions, Army Environmental Hygiene Agency Communications promulgation of additional hazardous waste guidelines which may have hospital wide implication.

7. The contaminated waste management hospital regulation contained at Appendix U should be submitted by the Preventive Medicine Activity to the Infections Control Committee for medical staff approval. Upon receipt of approval the regulation should be published with an effective date concurrent with occupancy of the COL Florence A. Blanchfield Army Community Hospital.

APPENDIX A
GLOSSARY OF TERMS

GLOSSARY OF TERMS

Biologic Wastes.	These are wastes which are created as a result of direct patient diagnosis or treatment. They include materials from medical, surgical, autopsy or laboratory origin.
Contamination.	It is that condition indicated by the presence of an infectious agent on a body surface in clothing, bedding, on trays, surgical instruments, dressings, needles or syringes, air or water.
Equipment.	It involves those items used in the practice of medical care which are durable in nature.
Fomite.	It consists of any inanimate object which is not of itself infectious, but is capable of harboring infectious micro-organisms which may be transmitted to persons.
Hazardous Wastes.	These wastes are those materials or combinations of materials that require special management due to potential chronic effects upon air or water of the environment.
Hospital Waste.	It is all waste generated within a hospital of which is not classified as infectious or pathological.
Infection.	It is that process through by an invasion of human body tissue takes place by pathogenic micro-organisms.
Infectious Waste.	It is any waste from patients who are on strict isolation, or respiratory isolation, and wastes from the microbiology laboratory, as well as surgical waste at the discretion of the operating room supervisor.
Incineration.	It is that process which involves thermal degradation of solids, liquids, or gases in order to yield carbon dioxide, water vapor, and inert ash as the primary outputs.
Medical Waste.	It is that waste category which includes all solid wastes generated within a hospital to include blood and blood products. It includes materials hitherto called "infectious," "pathological," "contaminated," "special," and "hazardous."

GLOSSARY OF TERMS (CON'T)

Nosocomial or Institutionally Acquired Infection	It is any infection that develops during a period of hospitalization, and is not present or incubating at the time of admission.
Pathogenic Wastes.	These are wastes which include micro-organisms that produce disease.
Pathological Waste.	It is any waste which includes human anatomical parts excluding corpses.
Putrescible Waste.	It is that waste which is capable of decomposition, causing environmental nuisances and/or obnoxious odors.
Rubbish.	This material includes all non-putrescible refuse except ashes. There are two categories of rubbish. They are combustible (paper, plastic, wood, rubber, etc.) and non-combustible (cans, needles, glass, mineral refuse, etc.).
Solid Waste.	It is that waste category which includes garbage, refuse, and other discarded solid materials, including solid waste, materials resulting from industrial, commercial, agricultural operations, and from community activities.
Supplies.	They include those items which are normally consumed through the health care encounter. This consumption includes the temporary change from "clean" to "dirty" requiring reprocessing before further use.
Wastes.	These are useless, unused, unwanted, or discarded materials.

APPENDIX B

CENTER FOR DISEASE CONTROL (CDC)
CLASSIFICATION OF ETIOLOGIC AGENTS

CENTER FOR DISEASE CONTROL (CDC)
CLASSIFICATION OF ETIOLOGIC AGENTS

CLASSIFICATION OF BACTERIAL AGENTS

Class 2

Actinobacillus - all species except A. mallai which is in Class 3
Arizona hinshawii - all serotypes
Bacillus anthracis
Bordetella - all species
Borrelia recurrentis, B. vincentii
Clostridium botulinum, C. chauvoei, C. haemolyticum, C. histolyticum,
C. novyi, C. septicum, C. tetani
Corynebacterium diphtheriae, C. equi, C. renale
Diplococcus pneumoniae
Erysipelothrix insidiosa
Escherichia coli - all enteropathogenic serotypes
Haemophilus ducreyi, H. influenzae
Herellae vaginicola
Klebsiella - all species and all serotypes
Listeria - all species
Mima polymorpha
Moraxella - all species
Mycobacterium - all species except those listed in Class 3
Mycoplasma - all species except M. mycoides and M. agalactiae, which
are in Class 5
Neisseria gonorrhoeae, N. meningitidis
Pasteurella - all species except those listed in Class 3
Salmonella - all species and all serotypes
Shigella - all species and all serotypes
Sphaerophorus necrophorus
Staphylococcus aureus
Streptobacillus moniliformis
Streptococcus pyogenes
Treponema carateum, T. pallidum, T. pertenue
Vibrio fetus, V. comma including biotype El Tor, V. parahaemolyticus

Class 3

Actinobacillus mallei
Bartonella - all species
Brucella - all species
Francisella tularensis
Mycobacterium avium, M. bovis, M. tuberculosis
Pasteurella multocida type B ("buffalo" and other foreign virulent strains)
Pseudomonas pseudomallei
Yersinia pestis

CLASSIFICATION OF FUNGAL AGENTS

Class 2

Actinomycetes (including Nocardia species and Actinomyces species and Arachnia propionica)
Blastomyces dermatitidis
Cryptococcus neoformans
Paracoccidioides brasiliensis

Class 3

Coccidioides immitis
Histoplasma capsulatum
Histoplasma capsulatum var. duboisii

CLASSIFICATION OF PARASITIC AGENTS

Class 2

Entamoeba histolytica
Leishmania sp.
Naegleria gruberi
Toxocara canis
Toxoplasma gondii
Trichinella spiralis
Trypanosoma cruzi

Class 2

Schistosoma mansoni

CLASSIFICATION OF VIRAL, RICKETTSIAL, AND CHLAMYDIAL AGENTS

Class 2

Adenovirus - human - all types
Cache Valley virus
Coxsackie A and B viruses
Cytomegaloviruses
Encephalomyocarditis virus (EMC)
Flanders virus
Hart Park virus
Hepatitis - associated antigen material
Herpesvirus - except Herpesvirus simiae (Monkey B virus) which is in
 Class 4
Coronavirus
Influenzavirus - all types except A/PR8/34 which is in Class 1
Langat virus
Lymphogranuloma venereum
Measles virus
Mumps virus
Parainfluenza virus - all types except Parainfluenza virus 3, SF4
 strain, which is in Class 1
Poliovirus - all types, wild and attenuated
Poxvirus - all types except Alastrun, smallpox, monkeypox, and
 whitepox which, depending on experiments, are in Class 3 or
 Class 4
Rabies virus - all strains except Rabies street virus, which should
 be classified in Class 3 when inoculated into carnivores
Reovirus - all types
Respiratory syncytial virus
Rhinovirus - all types
Rubella virus
Simian virus - all types except Herpesvirus simiae (Monkey B virus)
 and Marbug virus, which are in Class 4
Sindbis virus
Tensaw virus
Turlock virus
Vaccinia virus
Varicella virus
Vole rickettsia
 Yellow fever virus, 17D vaccine strain

Class 3

Alastrun, smallpox, monkeypox, and whitepox, when used in vitro
Arbovirus - all strains except those in Class 2 and 4 (Arboviruses
indigenous to the United States are in Class 3, except those listed
in Class 2. West Nile and Semliki Forest viruses may be classified
up or down, depending on the conditions or use and geographical
location of the laboratory).
Dengue virus, when used for transmission or animal inoculation
experiments
Lymphocytic chorimeningitis virus (LCM)
Psittacosis-Ornithosis-Trachoma group of agents
Rabies street virus, when used in inoculations of carnivores (See
Class 2)
Rickettsia - all species except Vole rickettsia when used for
transmission or animal inoculation experiments
Vesicular stomatitis virus
Yellow fever virus - wild when used in vitro

Class 4

Alastrun, smallpox, monkeypox, and whitepox, when used for
transmission or animal inoculation experiments
Hemorrhagic fever agents, including Crimean hemorrhagic fever
(Congo), Junin and Machupo viruses, and others as yet undefined
Herpesvirus simiae (Monkey B virus)
Lassa virus
Marbug virus
Tick-borne encephalitis virus complex, including Russian
spring-summer encephalitis, Kyasanur Forest diseases, Omsk
hemorrhagic fever and Central European encephalitis viruses
Venezuelan equine encephalitis virus, epidemic strains, when used for
transmission or animal inoculation experiments
Yellow fever virus - wild, when used for transmission or animal
inoculation experiments

CLASSIFICATION OF FOREIGN ANIMAL PATHOGENS

Class 5

A. Animal agents excluded from the United States by law.

Virus of foot and mouth disease

B. Animal agents excluded by USDA administrative policy.

African horse sickness virus

African swine fever virus

Besnoitia besnoiti

Borna disease virus

Bovine infectious petechial fever virus

Camel pox virus

Ephemeral fever virus

Fowl plague virus

Goat pox virus

Hog cholera virus

Louping ill virus

Lumpy skin disease virus

Nairobi sheep disease virus

Newcastle disease virus (Asiatic strains)

Mycoplasma mycoides (contagious bovine pleuro-pneumonia)

Mycoplasma agalactiae (contagious agalactia of sheep)

Rickettsia ruminantium (heart water)

Rift Valley fever virus

Sheep pox virus

Swine vesicular disease virus

Teschen disease virus

Theileria annulata

Theileria bovis

Theileria hirci

Theileria lawrencei

Theileria parva (East Coast fever)

Trypanosoma vivax (Nagana)

Vesicular exanthema virus

Wesselsbron disease virus

Zymonema farciminosum (pseudofarcy)

Source: Center for Disease Control

APPENDIX C

MEMORANDUM FOR RECORD
CONTAMINATED WASTE HANDLING IN HOSPITALS

DEPARTMENT OF THE ARMY
HEADQUARTERS MEDICAL DEPARTMENT ACTIVITY
FORT CAMPBELL, KENTUCKY 42223



REPLY TO
ATTENTION OF:

AFZB-MC-XO

20 February 1981

MEMORANDUM FOR RECORD

SUBJECT: Contaminated Waste Handling in Hospitals

1. I spoke with CPT Michael M. Monroe, Chief of the Waste Identification and Management Branch at the Army Environmental Hygiene Agency on 10 February 1981, after consulting with LTC J. Gensler, Chief of the Environmental Protection Division of AEHA on 6 February 1981.
2. It was fairly obvious that at the national level the United States Army is grappling with the problem of how to classify hospital generated waste. There are a myriad of by-products of the health care process. These range from pathogenic specimens and anatomic waste to material coming from known carriers of infectious bacterial/viral agents. The decision process is hampered by a delay in publication of definitive guidance along these lines by the Environmental Protection Agency. This guidance was scheduled for publication in September 1980 and has not yet been promulgated in the Federal Register.
3. CPT Monroe is responsible for the rewriting of Army Regulation 40-5 entitled, Health and Environment. He referred to the need for hospitals to develop a dual collection system involving both general and infectious/contaminated waste. He stated that all waste should be treated carefully while within the hospital due to the possible improper segregation of waste on a nursing unit. He felt that a relatively small amount of waste would be properly considered to be necessary for treatment as red bag material. The average community hospital will generate less than 200 pounds of such waste daily.

James W. Taylor, Jr.
JAMES W. TAYLOR, JR.
MAJ, MSC
Administrative Resident

APPENDIX D

MEMORANDUM FOR RECORD
STATE CONTAMINATED WASTE STANDARDS (KENTUCKY)



DEPARTMENT OF THE ARMY
HEADQUARTERS MEDICAL DEPARTMENT ACTIVITY
FORT CAMPBELL, KENTUCKY 42223

REPLY TO
ATTENTION OF:

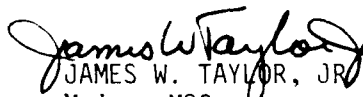
AFZB-MC-H-XO

20 February 1981

MEMORANDUM FOR RECORD

SUBJECT: State Contaminated Waste Standards (Kentucky)

1. I telephonically explored the Kentucky State Department for Human Services on 21 and 22 December 1980. I searched for the persons who could articulate the state's position on the collection and treatment of hospital waste.
2. Those with whom I could gain the most were Mr. Larry Hood and Mr. Mohammed Alouddin of the Division of Hazardous Materials. There appeared to be a great deal of debate even within the division as to a proper or adequate definition of hazardous waste as it pertains to hospitals. The debate as to whether hospital waste should be included within the generic classification of hazardous waste is even present within the United States Government's Environmental Protection Agency. This is illustrated by the delayed promulgation of this definition from the October 1980 time frame until present. The Presidential moratorium on all regulations until 20 March effectively continues this debate.
3. I gained much from the conversation in terms of the lack of precision existent in the regulating agencies regarding this issue. Larry Hood agreed to send me a copy of 902 KAR 20:010 which provides state regulatory guidance to the Kentucky Health Facilities and Health Services Certificate of Need and Licensure Board relating to hospital facilities requirements.


JAMES W. TAYLOR, JR.
Major, MSC

APPENDIX E

SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS

SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS

PLEASE INDICATE YOUR TEN GREATEST CONCERNS REGARDING CONTAMINATED/INFECTIOUS WASTE MANAGEMENT CONCERN (PLEASE PRINT) THANK YOU.

A. _____ PRIORITY _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

I. _____

J. _____

APPENDIX F

CONTAMINATED WASTE/INFECTIOUS CONTROL SURVEY INSTRUMENT

UNITED STATES GOVERNMENT
memorandum

DATE: 10/10/51
REPLY TO: [Faint text]
ATTN OF: [Faint text]
SUBJECT: [Faint text]

TO:

[Faint body text]



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

OPTIONAL FORM NO. 10
(REV. 7-76)
GSA FPMR (41 CFR) 101-11.6
5010-111

CONTAMINATED WASTE/INFECTIOUS CONTROL SURVEY

This survey has as its purpose to acquire baseline information regarding contaminated waste handling within the hospital environment. The information acquired will be used in a problem solving research project by the Health Care Administration Resident at the US Army Community Hospital, Ft Campbell, KY. This research is being done under the auspices of the U.S. Army-Baylor University Graduate Program in Health Care Administration.

A pre-addressed envelope is provided for your convenience. Should the inclosed envelope become misplaced, please complete and return the attached survey instrument to the following address:

Major James W. Taylor, Jr.
Administrative Resident
US Army Community Hospital
Ft Campbell, Kentucky 42223

Should any portion of the survey be felt to be too sensitive to complete, please make an appropriate remark and move to the next portion.

Return of this survey at your earliest convenience, around 20 February or before, will be greatly appreciated.

CONTAMINATED WASTE/INFECTIOUS CONTROL SURVEY

(Use attachments, if necessary, with reference made to these sheets)

I. Philosophy

A. What is your facility's operating definition of contaminated waste?

B. What is your facility's operating definition of nosocomial infection?

C. Which group is physically responsible to pick up your contaminated waste and move to incinerator?

Nursing Logistics Laboratory Contractual

D. Do your waste removal personnel receive periodic infection control inservice training?

Yes No Each months

E. What color plastic bags are used to collect contaminated waste?

Black Yellow Clear
 Red Green Other

II. Quantitative Data

A. What quantity of contaminated waste is generated on a daily basis within your facility?

Month	# Bags	Weight	Month	# Bags	Weight
Jan	_____	_____	Jul	_____	_____
Feb	_____	_____	Aug	_____	_____
Mar	_____	_____	Sep	_____	_____
Apr	_____	_____	Oct	_____	_____
May	_____	_____	Nov	_____	_____
Jun	_____	_____	Dec	_____	_____

B. What is the percentage of contaminated waste and general waste or rubbish generated within your facility?

_____ % Contaminated Waste

_____ % General Waste

C. What is your monthly nosocomial infection rate?

Month	Nosocomial Infections	Total Discharges*	Month	Nosocomial Infections	Total Discharges*
Jan	_____	_____	Jul	_____	_____
Feb	_____	_____	Aug	_____	_____
Mar	_____	_____	Sep	_____	_____
Apr	_____	_____	Oct	_____	_____
May	_____	_____	Nov	_____	_____
Jun	_____	_____	Dec	_____	_____

*Excluding Psychiatric

D. What has been your average number of occupied beds?

Jan	_____	Jul	_____
Feb	_____	Aug	_____
Mar	_____	Sep	_____
Apr	_____	Oct	_____
May	_____	Nov	_____
Jun	_____	Dec	_____

E. What is your official size or licensed capacity?

_____ Operating Beds

III. Assessment Data

A. Does your facility have pneumatic trash tubes for contaminated waste removal?

Yes No

B. What problems in maintenance, cleaning, obstruction of the tubes have you had?

C. Does your facility have a trash compactor used in conjunction with the contaminated waste removal?

Yes No

D. What problems in maintenance, cleaning, of the compactor have you had?

APPENDIX G

CONSENSUS SURVEY

UNITED STATES GOVERNMENT
memorandum

DATE:

REPLY TO
ATTN OF:

SUBJECT: Consensus Survey

TO:

This is the package of data of which we spoke on Wednesday.

Please review research material and indicate your opinion on the consensus survey.

Please return to the undersigned or phone to be picked up by next Monday.

Thanks.

JAMES W. TAYLOR, JR.
Major, MSC
Admin Resident

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan



OPTIONAL FORM NO. 10
(REV. 7-76)
GSA FPMR (41 CFR) 101-11.6
5010-111

CONSENSUS SURVEY

Six other persons have been asked to evaluate the statements below regarding the new hospital, along with you. The categories of respondents are shown below:

Administrative	2
Nursing	2
Physician	2
Unspecified	1

The individuals selected to participate in the survey were chosen in order to represent the widest possible perspective regarding contaminated waste management.

You have been provided with the partial results of a survey of fourteen hospitals both within the local region and equivalent sized military hospitals. This body of knowledge may prove useful in evaluating statements and forming a consensus.

Please review each of the statements below and indicate your opinion in the space provided on the right.

Thank you in advance for your assistance.

Statement	Agree	Undecided	Disagree
I. The definition of contaminated waste for the COL Florence A. Blanchfield Hospital should include:			
a. All disposable materials from patients in isolation rooms only.			
b. All disposable materials from all patient rooms.			
c. Selected disposable materials from patients in isolation rooms only. (Examples:)			
d. Selected disposable materials from all patients rooms. (Examples:)			

Statement	Agree	Undecided	Disagree
e. All disposable materials from care and treatment of all septic (<i>communicable</i>) outpatients.			
f. All disposable materials from care and treatment of all outpatients.			
g. Selected disposable materials from outpatients in isolation care rooms only. (Examples:)			
h. Selected disposable materials from all outpatients in any room. (Examples:)			
II. The nosocomial infection rate should present the following trends upon movement to the new hospital.			
a. Decrease upon occupancy of the new facility.			
A-1 Between 0.0-0.9% (inclusive)			
A-2 Between 1.0-4.9% (inclusive)			
A-3 Between 5.0-10% (inclusive)			
A-4 Uncertain but decrease			
b. Remain essentially unchanged upon occupancy of the new facility			
c. Increase upon occupancy of the new facility.			
C-1 Between 0.0-0.9% (inclusive)			
C-2 Between 1.0-4.9% (inclusive)			
C-3 Between 5.0-10% (inclusive)			
C-4 Uncertain but increase			

Statement	Agree	Undecided	Disagree
III. The volume of contaminated waste generated within the new facility will:			
a. Be reduced upon occupancy of the buildings.			
A-1 Between 0.0-4.9% (inclusive)			
A-2 Between 5.0-9.9% (inclusive)			
A-3 Between 10.0-14.9% (inclusive)			
A-4 Uncertain but decrease			
b. Be essentially unchanged			
c. Be increased upon occupancy of the buildings.			
C-1 Between 0.0-4.9% (inclusive)			
C-2 Between 5.0-9.9% (inclusive)			
C-3 Between 10.0-14.9% (inclusive)			
C-4 Uncertain but increase			
IV. The pneumatic trash chutes in the new buildings should only be used for:			
a. Administrative waste (refuse)			
b. Food waste (garbage)			
c. Infectious waste (contaminated) incl Pathology			
d. Sharps			
e. Administrative and food			
f. Administrative and infectious			
g. Food and infectious			
h. Administrative and sharps			
(i.-l. cont'd next page)			

Statement	Agree	Undecided	Disagree
i. Food and sharps			
j. Infectious and sharps			
k. All the above (a,b,c,d)			
l. None of above (a,b,c,d)			
V. The pneumatic trash tubes should be locked to preclude "inappropriate" discards.			
VI. The pneumatic trash tubes should be operated by Logistic (housekeeping) personnel on a timely basis to preclude excessive build up of material.			
VII. Waste removal should be accomplished on following shifts.			
a. 1st			
b. 2nd			
c. 3rd			
d. 1st and 2nd			
e. 1st and 3rd			
f. 2nd and 3rd			
VIII. In the future, will the concerns voiced in health care regarding contaminated (infectious) waste management			
a. Increase			
b. Remain at the same level			
c. Decrease			

AD-A195 188

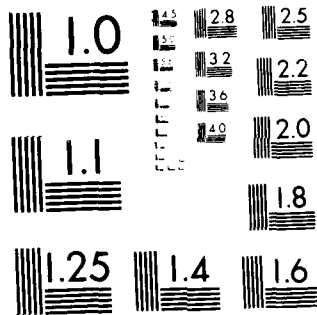
A STUDY OF WASTE MANAGEMENT WITHIN THE COL FLORENCE A
BLANCHFIELD ARMY CO. (U) ARMY HEALTH CARE STUDIES AND
CLINICAL INVESTIGATION ACTIVITY P. J. W. TAYLOR AUG 81
NCSTA-22-88 P/C 6712

2/2

UNCLASSIFIED

NL

END
DATE
FILMED
88



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Statement	Agree	Undecided	Disagree
IX. Liquid waste such as urine, feces, vomitus, blood, or other body fluids may be disposed of in the sanitary sewers.			
X. All solid waste should be containerized at the point of generation.			
XI. Contaminated (infectious) waste should be double bagged using red exterior bags.			
XII. Fetuses or other anatomically distinct tissue materials should be personally handled by Pathology Department personnel.			

Again, thank you for your assistance.

APPENDIX H

ANALYSIS
SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS

ANALYSIS
SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS

<u>Concern</u>	<u>Number of Responses</u>	<u>Aggregate Concern</u>	<u>Mean Concern</u>
Back-up plan	2	11	5.5
Cleaning Chutes	2	6	3.0
Cleaning compactor, dumpster and/or Transporters	2	14	7.0
Container Marking	1	7	7.0
Container Staging (Sufficiency)	2	9	4.5
Contaminated Waste Definition	5	9	1.8
Cross contamination of delivery dock area	2	12	6.0
Decontamination of Waste	2	9	4.5
Detection of infection in non-contaminated/infectious system	1	6	6.0
Effectiveness Monitoring System	1	8	8.0
Fewest handlers and steps in process	2	13	6.5
Jamming of Chutes	1	6	6.0
Inappropriate material in chutes	1	8	8.0
Proper packaging of waste (double bagging)	5	19	3.8
Quantity of waste produced	1	10	10.0
Safe and responsible handling	1	6	6.0
Security of waste chutes	2	8	4.0
Separation of waste by categories and independent system operation	4	14	3.5

SURVEY OF CONTAMINATED WASTE MANAGEMENT CONCERNS (CONT'D)

<u>Concern</u>	<u>Number of Responses</u>	<u>Aggregate Concern</u> ^A	<u>Mean Concern</u> ^B
Sources of waste	1	8	8.0
Storage of waste without mix up or pilferage	3	14	4.7
Sufficient back-up equipment	1	7	7.0
Sufficient number of handlers	1	5	5.0
Terminal disposal of waste	3	27	9.0
Timely removal of waste	2	12	6.0
Training of generators and handlers	5	18	3.6
Waste management route	3	19	6.3

NOTE:

A - This represents the product of the number of concerns expressed with the priority. Example - 3 - priority #3 and 2 - priority #2 = 13 aggregate concern.

B - This represents the quotient of the aggregate concern and the total number of concerns expressed. Example - 13 aggregate concern ÷ 5 responses = 2.6 (mean concern).

APPENDIX I
WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)

WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)
 US Army Community Hospital
 Fort Campbell, Kentucky

BAGS OF WASTE

Oct 20-24	Oct 27-31	Nov 3-7	Nov 10-14	Nov 17-21	Nov 24-28	Dec 1-5	Dec 8-12	Dec 15-19	Dec 22-26	Dec 29-2	Jan 5-9	Jan 12-16	Jan 19-23	Jan 26-30	Feb 2-6	Feb 9-13	Feb 16-20	Feb 23-27
23	22	40	42	44	16	42	49	63	31	31	55	49	57	48	50	49	32	37
11	10	9	8	10	6	10	10	9	6	6	10	10	10	9	10	10	8	10
6	7	6	6	6	2	5	7	6	4	6	4	3	11	7	9	8	2	4
1	3	5	6	5	3	5	5	4	2	2	4	5	5	7	5	4	4	5
5	5	5	4	5	4	5	6	4	5	2	6	5	5	5	5	5	4	5
0	7	10	10	4	8	13	16	13	9	9	16	18	13	14	15	18	11	8
0	0	4	1	0	0	5	3	3	2	1	6	2	23	39	32	1	3	3
0	0	0	0	1	1	1	0	2	1	0	6	2	0	0	4	0	0	0
1	0	0	0	1	1	3	1	5	2	0	0	2	1	1	1	2	2	0
0	0	0	0	0	0	3	3	1	0	2	1	1	0	1	3	1	0	0
1	3	2	4	0	3	3	3	4	0	0	0	5	2	11	16	29	15	12
0	3	3	2	2	1	4	5	8	0	0	0	9	2	4	4	19	5	1
1	0	2	2	1	3	3	6	5	0	0	1	3	1	1	0	0	1	1
5	8	20	9	8	7	9	21	11	14	3	7	4	16	14	20	13	12	15
3	5	7	7	7	3	9	9	7	4	2	4	7	4	6	8	8	3	5
0	0	1	1	1	2	4	5	6	1	0	2	4	3	5	2	3	1	2
5	4	4	3	5	4	4	5	5	3	1	3	5	5	4	5	5	4	5
4	5	5	4	5	3	4	5	5	0	0	3	5	5	3	2	2	3	4
1	0	0	1	0	0	1	1	0	1	0	0	1	0	1	1	0	0	1
2	1	0	0	0	0	0	0	1	0	0	3	1	0	0	1	3	1	1
1	4	1	3	4	2	5	5	4	0	0	0	2	1	1	0	0	0	0
4	2	3	3	4	2	4	4	4	0	0	3	5	3	2	5	5	2	5
2	0	1	2	1	0	4	4	5	0	0	3	3	3	3	3	5	2	0
4	1	3	4	4	0	3	5	5	0	0	3	4	5	3	5	5	2	3
2	4	2	0	4	2	5	5	4	0	0	0	0	1	0	3	3	2	2
4	2	3	3	4	2	10	5	5	2	1	3	3	3	1	3	4	1	2
A	A	A	A	A	A	A	A	A	0	1	1	3	3	2	3	2	2	0
54	65	58	61	70	5	89	100	113	22	11	86	106	116	76	101	103	61	64
A	A	A	A	A	A	A	A	A	0	1	0	2	2	0	3	4	2	0
50	151	193	183	191	80	249	287	297	110	79	230	269	300	263	319	315	184	195
0	30.2	38.6	36.6	38.2	16.0	49.8	57.4	59.4	22.0	15.8	46.0	53.8	60.0	52.6	63.8	63.0	36.8	39.0

SOURCE: Housekeeping

WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)
 US Army Community Hospital
 Fort Campbell, Kentucky

BAGS OF WASTE

Activity	Bldg/Ward	Oct		Nov		Nov		Dec		Dec		Jan		Jan	
		20-24	27-31	3-7	10-14	17-21	24-28	1-5	8-12	15-19	22-26	29-2	5-9	12-1	
Labor and Delivery	122A/1A	23	22	40	42	44	16	42	49	63	31	31	55	49	
Maternity	122B/1B	11	10	9	8	10	6	10	10	9	6	6	10	10	
Newborn Nursery	124A/2A	6	1	6	6	6	2	5	7	6	4	6	4	3	
Midwife Clinic	124B/2B	1	3	5	6	5	3	5	5	4	2	2	4	5	
OB-GYN Clinic	126B/3B	5	5	5	4	5	4	5	6	4	5	2	6	5	
Pediatric Ward	134A/7A	10	7	10	10	4	8	13	16	13	9	9	16	18	
Intensive Care Ward	134C/7C	0	0	4	1	0	0	5	3	3	2	1	6	2	
Respiratory Therapy	134D/7D	0	0	0	0	0	1	1	0	2	1	0	6	2	
Orthopedic Ward	136B/8B	1	0	0	0	1	1	3	1	5	2	0	0	2	
Cast room	140B/10B	0	0	0	0	0	0	3	3	1	0	2	1	1	
Med/Surg (Male)	140D/10D	1	3	2	4	0	3	3	3	4	0	0	0	5	
Med/Surg (Female)	142C/11C	0	3	3	2	2	1	4	5	8	0	0	0	9	
Med/Surg (Female)	142D/11D	1	0	2	2	1	3	3	6	5	0	0	1	3	
Emergency Clinic	146A/13A	15	8	20	9	8	7	9	21	11	14	3	7	4	
Surgical Clinic	148A/14A	3	5	7	7	7	3	9	9	7	4	2	4	7	
Urology Clinic	148B/14B	0	0	1	1	1	2	4	5	6	1	0	2	4	
Eagle Clinic	148C/14C	5	4	4	3	5	4	4	5	5	3	1	3	5	
Physical Therapy Cl.	148D/14D	4	5	5	4	5	3	4	5	5	0	0	3	5	
Inpatient Pharmacy	125A/18A	1	0	0	1	0	0	1	1	0	1	0	0	1	
Medical Clinic	147A/25A	2	0	0	0	0	0	0	3	1	0	0	3	1	
Immunization Clinic	147B/25B	1	1	0	0	0	0	0	0	0	1	0	0	2	
Well Baby Clinic	149A/26A	4	2	3	3	4	2	5	5	4	0	0	3	5	
Dermatology Clinic	149B/26B	2	0	1	2	1	2	4	4	4	0	0	3	3	
Pediatric Clinic	149C/26C	4	1	3	4	4	0	3	5	5	0	0	3	4	
Pediatric Clinic	149D/26D	2	4	2	0	4	2	5	5	4	0	0	0	0	
Laboratory	118/NA	4	2	3	3	4	2	10	5	5	2	1	3	3	
Dental Clinic	118/NA	A	A	A	A	A	A	A	A	A	0	1	1	3	
Operating Room	119/NA	54	65	58	61	70	5	89	100	113	22	11	86	106	
ENT Clinic	118/NA	A	A	A	A	A	A	A	A	A	0	1	0	2	
Total Bags		160	151	193	183	191	80	249	287	297	110	79	230	269	
Hospital Average Daily		32.0	30.2	38.6	36.6	38.2	16.0	49.8	57.4	59.4	22.0	15.8	46.0	53.9	

NOTE: A - Not a Collection Site

APPENDIX J

WEIGHT ANALYSIS

WEIGHT ANALYSIS
WEEKLY VOLUME OF WASTE (WEEKENDS EXCLUDED)
US Army Community Hospital
Fort Campbell, Kentucky

<u>Period</u>	<u>Weight/Period (LB)</u>	<u>Number of Bags/Period</u>	<u>Weight/Bag (LB)</u>
20 Oct - 24 Oct	994.75	160	6.22
27 Oct - 31 Oct	939.00	151	6.22
3 Nov - 7 Nov	1,188.75	193	6.16
10 Nov - 14 Nov	1,109.50	183	6.06
17 Nov - 21 Nov	1,347.25	191	7.05
24 Nov - 28 Nov	713.25	80	8.92
1 Dec - 5 Dec	1,585.00	249	6.37
8 Dec - 12 Dec	1,822.75	287	6.35
15 Dec - 19 Dec	1,902.00	297	6.40
22 Dec - 26 Dec	554.75	110	5.04
29 Dec - 2 Jan	475.50	79	6.02
5 Jan - 9 Jan	1,505.75	230	6.55
12 Jan - 16 Jan	1,664.00	269	6.19
19 Jan - 23 Jan	1,665.00	300	5.55
26 Jan - 31 Jan	1,426.50	263	5.42
2 Feb - 6 Feb	1,822.75	319	5.71
9 Feb - 13 Feb	1,822.00	315	5.78
16 Feb - 20 Feb	1,268.00	184	6.89
23 Feb - 27 Feb	1,347.25	195	6.91
Aggregate Weight	25,153.75		
Aggregate Number of Bags		4,055	
Weight Range - Low			5.04
Weight Range - High			8.92
Weight Mean			6.20

SOURCE: Housekeeping Records, US Army Community Hospital,
Ft Campbell, Kentucky

APPENDIX K

INPATIENT DAYS SUMMARY

INPATIENT DAYS SUMMARY
 US ARMY COMMUNITY HOSPITAL
 FT CAMPBELL, KENTUCKY

PATIENT DAYS

Oct 20-24	Oct 27-31	Nov 3-7	Nov 10-14	Nov 17-21	Nov 24-28	Dec 1-5	Dec 8-12	Dec 15-19	Dec 22-26	Dec 29-2	Jan 5-9	Jan 12-16	Jan 19-23	Jan 26-30	Feb 2-6	Feb 9-13	Feb 16-20	Feb 23-27
69.5	68	81	88.5	47.5	51	58.5	74	81	58	64	85	89	83	62.5	65.5	57.5	75.5	75
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
53.5	52	66.5	76.5	40	37.5	45	65	68.5	52	56	70.5	86	82.5	53.5	67	71	70.5	75.5
39	28.5	42	29	18	15	40	25.5	22.5	22	14	27.5	32	39	22.5	19.5	46.5	39.5	32.5
29.5	11	14.5	21.5	18	16	21	22	11	6	13	23.5	22	26.5	20	28.5	25	24	20
101	101	97	109	125	79	86.5	100	129	48.5	46	82	113	129.5	147.5	145	155	155.5	147.5
197	146.5	148.5	128.5	159	80	82.5	120	92	12.5	48	146.5	191.5	158.5	112.5	137.5	175	157	115
72	70.5	87.5	99	72.5	72.5	124	123	98	24.5	325	77.5	108	101.5	81.5	95	91.5	70.5	97
B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
561.5	477.5	537	552	480	351	457.5	529.5	502	223.5	273.5	512.5	641.5	620.5	500	558	621.5	592.5	562.5
112.3	95.5	107.4	110.4	96	70.2	91.5	105.9	100.4	44.7	54.7	102.5	128.3	124.1	100	111.6	124.3	118.5	112.5

SOURCE: Department of Nursing Records

with 122A/1A
 with 142C/10C

INPATIENT DAYS SUMMARY
US ARMY COMMUNITY HOSPITAL
FT CAMPBELL, KENTUCKY

PATIENT DAYS

Activity	Bldg/Ward	PATIENT DAYS											
		Oct 20-24	Oct 27-31	Nov 3-7	Nov 10-14	Nov 17-21	Nov 24-28	Dec 1-5	Dec 8-12	Dec 15-19	Dec 22-26	Dec 29-2	Jan 5
Labor and Delivery	122A/1A	69.5	68	81	88.5	47.5	51	58.5	74	81	58	64	85
Maternity	122B/1B	A	A	A	A	A	A	A	A	A	A	A	A
Newborn Nursery	124A/2A	53.5	52	66.5	76.5	40	37.5	45	65	68.5	52	56	70
Pediatric Ward	134A/7A	39	28.5	42	29	18	15	40	25.5	22.5	22	14	27
Intensive Care Ward	134C/7C	29.5	11	14.5	21.5	18	16	21	22	11	6	13	23
Orthopedic Ward	136B/8B	101	101	97	109	125	79	86.5	100	129	48.5	46	82
Med/Surg (Male)	140D/10D	197	146.5	148.5	128.5	159	80	82.5	120	92	12.5	48	146
Med/Surg (Female)	142C/11C	72	70.5	87.5	99	72.5	72.5	124	123	93	24.5	325	77
Med/Surg (Female)	142D/11D	B	B	B	B	B	B	B	B	B	B	B	B
Period Total		561.5	477.5	537	552	480	351	457.5	529.5	502	223.5	273.5	512
Daily Average		112.3	95.5	107.4	110.4	96	70.2	91.5	105.9	100.4	44.7	54.7	102

NOTES:

- A - Data collected aggregated with 122A/1A
- B - Data collected aggregated with 142C/10C
- * - Period consists of 5 days.

APPENDIX L

NOSOCOMIAL INFECTION STATISTICS

NOSOCOMIAL INFECTION STATISTICS
US ARMY COMMUNITY HOSPITAL
Ft Campbell, Kentucky

<u>MONTH</u>	<u>NUMBER OF DISCHARGES</u>	<u>NUMBER OF INFECTIONS</u>	<u>INFECTION RATE (%)</u>
1980			
JAN	576	13	2.25
FEB	482	9	1.87
MAR	560	13	2.32
APR	585	14	2.31
MAY	599	11	1.84
JUN	626	4	0.64
JUL	596	11	1.85
AUG	608	12	1.97
SEP	657	24	3.65
OCT	614	15	2.44
NOV	564	10	1.77
DEC	569	12	2.11
Annual Summary	7,036	148	2.10
1981			
JAN	677	10	1.48
FEB	662	24	3.63
MAR	758	11	1.45
Quarterly Summary	2,097	45	2.15
Annualized Summary	8,388	180	2.15
15 Month Summary	9,133	193	2.11

SOURCE: Infection Control Committee Records, US Army Community Hospital, Fort Campbell, Kentucky

APPENDIX M

MEMORANDUM FOR RECORD
HEALTH FACILITY STUDY

20 February 1981

AFZB-MC-H-XO

SUBJECT: Health Facility Study

MEMORANDUM FOR RECORD

1. In order to gather a relevant indication of potential problems with contaminated management within the COL Florence A. Blanchfield Army Hospital, it was determined crucial to survey presently operational hospitals of similar size and mission. It was felt necessary to contact health facility planning personnel at the USA Health Services Command (HSC) as well as the US Army Health Facility Planning Agency (HFPA).
2. I contacted COL Robert Herek, Chief, Facilities Division, Office of the Deputy Chief of Staff for Logistics, HSC on 1 December 1980. We spoke at length regarding facility data necessary for comparison and data base development. We agreed that data such as internal operating systems and specific configuration was not available at the HSC level.
3. I made contact with LTC James Peacock, Deputy Director, HFPA on 17 December 1980. I presented my concept of the data necessary to determine the sample for survey. I was concerned with hospitals which served similar populations, that is to say, divisional installations. I also had concern with training center supporting hospitals since Fort Campbell has a small increment of basic training. Finally, I felt it necessary to limit the discussion to those health care facilities which had the potential for relatively similar operating systems. The result of these phone conversations and a review of the Fourth Quarter FY 1980 Command Performance Summary from HSC indicated the following facilities would represent proper candidates for survey:

<u>INSTALLATION</u>	<u>INSTALLATION CATEGORY</u>
Fort Bragg	Division
Fort Hood	Division
Fort Ord	Division
Fort Riley	Division
Fort Benning	Training
Fort Jackson	Training
Fort Knox	Training
Fort Leonard Wood	Training
Fort Sill	Training

4. As an effort to gain insight into the operating problems within regional non-military facilities, it was decided to extend the survey to selected civilian facilities whose experiences could result in valid data. Those selected were as follows:

20 Feb 81

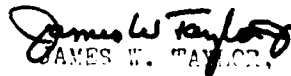
AFZB-MC-H-X0
SUBJECT: Health Facility Study

FACILITY

Clarksville Memorial Hospital
Grayson County Hospital
Jennie Stuart Hospital
Regional Medical Center of Hopkins County
Vanderbilt University Hospital
Veterans Administration Hospital

LOCATION

Clarksville, TN
Leitchfield, KY
Hopkinsville, KY
Madisonville, KY
Nashville, TN
Nashville, TN


JAMES W. TAYLOR, JR.
CAPTAIN, USAF

APPENDIX N

RESPONSES TO
CONTAMINATED WASTE/INFECTIONS CONTROL SURVEY
QUESTION II-D

SURVEY RESPONSE TO THE QUESTION

"What is your facility's operating definition of contaminated waste?"
(Question I-A)

[Contaminated waste is that] waste contaminated with body fluids, secretions and/or excreta from humans or animals undergoing medical diagnosis, care, and/or treatment; waste incident to the operation of a laboratory handling materials which are obviously or potentially contaminated with microorganisms; and certain medical waste requiring special handling.

[Contaminated waste is] any waste from patients on strict isolation, respiratory isolation procedures, waste from the microbiology laboratory, and surgical waste at the discretion of the operating room supervisor.

[Contaminated wastes are those] wastes contaminated with diseased organisms and/or offensive materials, bandages, sacrificed animal carcasses, laboratory tissue specimens, dressings, surgical wastes, food service wastes from infectious disease wards, used disposable syringes and needles, materials contaminated with blood, body exudates or excreta, infectious wastes incident to hospital and laboratory operations.

Contaminated waste is waste soiled with body fluids, secretions and/or treatment; waste incident to the operation of a laboratory handling materials which are obviously or potentially contaminated with microorganisms; and certain medical waste requiring special handling.

[Contaminated waste consists of] all material that has been contaminated with excreta, blood, exudates, or secretions.

[Contaminated waste is] waste which is or is "potentially contaminated" with disease organisms.

[Contaminated waste includes] all disposable items soiled with excreta, blood, exudate or any type of body secretions.

[Contaminated waste includes] any disposable item which has come into contact with body excreta. All items from isolation rooms, the operating room and labor and delivery [suites are included.]

[Contaminated waste involves] laboratory wastes including pathological specimens and disposable fomites attendant thereto. Pathological specimens shall include all tissues, specimens of blood elements, excreta and secretions obtained from patients. Fomites shall include any substance which may harbor or transmit pathogenic organisms. Surgical operating room pathologic specimens and disposable fomites attendant thereto. Similar disposable materials from outpatient areas and emergency rooms. Equipment, instruments, utensils, and fomites of a disposable nature from the rooms of patients with suspected or diagnosed communicable disease which by nature of the disease is required to be isolated by public health agencies.

SURVEY RESPONSE TO THE QUESTION NUMBER I-A (CON'T)

Contaminated waste is waste from isolation patients, laboratory, surgery and labor delivery.

[Contaminated waste is] any waste from an isolation room (those are patients who have communicable diseases or infectious conditions) or waste from septic surgery.

[Contaminated waste includes] any waste material that has become a potential infectious, toxic, or radioactive hazard. This includes all solid wastes contaminated with pathogenic microorganisms wastes from the microbiology laboratory. All blood specimens or blood products, pathology specimens and waste from patients on communicable disease isolation [as well as] sharp materials such as syringe needles are also included.

All hospital waste may be highly contaminated with pathogenic microorganisms and must be handled properly.

Contaminated wastes are those generated through; care of patients having infectious diseases or other infections, dressing [changes], surgical wastes, laboratory and pathology waste and materials from research projects.

SURVEY RESPONSE TO THE QUESTION

"What is your facility's operating definition of nosocomial infection?"
(Question I-B)

Nosocomial infections express themselves in hospitalized patients in whom the infection was not present or incubating at the time of admission.

[A nosocomial infection is] one that develops during hospitalization and was not present or incubating at the time of admission.

A nosocomial infection is one that develops during hospitalization and is not present or incubating at the time of admission to the hospital.

A nosocomial infection [is] an infection expressing itself in a patient in whom the infection was not present or incubating at the time of admission. [It may be] an infection that is directly related to or is the residual of a previous admission. [It is] any infection which the physician indicates, in the chart, is nosocomial in nature, whether or not additional supporting data is present.

[A nosocomial infection is] any infection that develops during hospitalization and was not incubating or present at the time of admission.

[A nosocomial infection is] any infection that develops during hospitalization and is not present or incubating at the time of admission.

[A nosocomial infection is] one that develops during hospitalization and was not present or incubating at the time of admission. When incubation period is unknown the infection will be considered nosocomial if signs and symptoms develop after admission.

[A nosocomial infection is] any infection which manifests itself after admission or is not incubating prior to admission.

[A nosocomial infection is] the invasion of human body tissues by pathogenic microorganisms.

We are in the process of reevaluating this and will be glad to send it to you when it is complete.

[A nosocomial infection is] an infection which occurs in patients after a period of confinement in the hospital without symptoms. A period of confinement [is defined as] more than three days.

[A nosocomial infection is] any infection that develops during hospitalization and is not present or incubating at the time of admission to the hospital.

SURVEY RESPONSE TO THE QUESTION I-B (CONT'D)

A nosocomial infection is one that develops during hospitalization and is not present or incubating at the time of admission to the hospital.

A nosocomial infection (hospital acquired) is an infection that develops during hospitalization and is not present or incubating at the time of admission to the hospital.

SURVEY RESPONSE TO THE QUESTION

"Which group is physically responsible to pick up your contaminated waste and move it to the incinerator?"

(Question I-C)

(N=14)

Nursing	7.1%
Logistics	42.9%
Laboratory	0.0%
Contractual	42.9%

SURVEY RESPONSE TO THE QUESTION:

"Do your waste removal personnel receive periodic infection control inservice training?"

(Question I-D, Part 1)

(N=14)

Yes 92.9%

No 7.1%

"Each _____ Months"
(Question I-D, Part 2)

None	6
1 - 2 Months	1
3 - 4 Months	2
5 - 6 Months	4
7 - 8 Months	0
9 -10 Months	0
11 -12 Months	1

Average of those responding was 5.5 months.

SURVEY RESPONSE TO THE QUESTION

"What color plastic bags are used to collect contaminated waste?"

(Question I-E)

(N=14)

Black	7.1%
Red	57.2%
Yellow	21.4%
Green	0.0%
Clear	14.3%
Other	0.0%

SURVEY RESPONSE TO THE QUESTION

"What quantity of contaminated waste is generated on a daily basis within your facility?"

(Question II-A)

<u>Facility</u>	<u>Volume (Bags)</u>	<u>Weight (LBS)</u>
A	N/A	N/A
B	N/A	1000
C	80	10
D	N/A	N/A
E	N/A	N/A
F	53	131
G	N/A	N/A
H	N/A	388
I	N/A	N/A
J	15	75
K	N/A	N/A
L	N/A	500
M	4	N/A
N	N/A	N/A
Mean Responses	38 (N=4)	351 (N=6)

N/A = Data not available or not collected

SURVEY RESPONSE TO THE QUESTION

"What is the percentage of contaminated waste and general waste on rubbish generated within your facility?"

(Question II-B)

<u>Facility</u>	<u>Contaminated</u>	<u>General Waste</u>
A	5.0	95.0
B	25.0	75.0
C	15.0	85.0
D	N/A	N/A
E	N/A	N/A
F	26.5	74.5
G	N/A	N/A
H	35.0	65.0
I	3.0	97.0
J	3.0	97.0
K	5.0	95.0
L	2.0	98.0
M	N/A	N/A
N	N/A	N/A
Mean Response	13.3	86.7

N/A - Not available/not collected

SURVEY RESPONSE TO THE QUESTION

"What is your monthly nosocomial infection rate?"
(Question II-C)

<u>Facility</u>	<u>Annual Nosocomial Infections (Total)</u>	<u>Annual Discharges (Total)</u>	<u>Annualized Infection Rate (%)</u>
A	140	14,429	0.97
B	154	9,513	1.62
C	137	10,691	1.28
D	180	7,117	2.53
E	198	8,628	2.29
F	76	6,612	1.15
G	352	12,837	2.74
H	208	7,930	2.63
I	66	12,400	0.53
J	266	10,822	2.46
K	6	3,082	0.19
L	290	10,191	2.85
M	647	20,945	3.09
N	343	8,228	4.17
Aggregate	3063	143,425	2.14

NOTE: ◦Infection rate computed by formula $IR = \frac{\text{Total Infections}}{\text{Total Discharges}} \times 100 (\%)$

◦Data for CY 1980

SURVEY RESPONSE TO THE QUESTION

"What has been your average number of occupied beds?"
(Question II-D)

<u>Facility</u>	<u>Accumulated Annual Beds Occupied</u>	<u>Average Daily Beds Occupied</u>
A	65,330	179
B	64,745	177
C	53,109	146
D	61,794	169
E	48,018	132
F	28,135	77
G	73,000	200
H	47,242	130
I	55,477	152
J	95,730	262
K	21,189	58
L	57,365	157
M	155,405	426
N	138,472	380
Sample Aggregate	965,011	2,644
Mean Facility	68,929	189

Note:

A - Estimated

B - Excluding Nurseries, NICU

SURVEY RESPONSE TO THE QUESTION

"What is your official size or licensed capacity?"
(Question II-E)

<u>Facility</u>	<u>Operating Beds</u>
A	234
B	255
C	250
D	410
E	226
F	200
G	283
H	180
I	207
J	392
K	75
L	216
M	561
N	485
Mean Size	284

SURVEY RESPONSE TO THE QUESTION

"Does your facility have pneumatic trash tubes for contaminated waste removal?"
(Question III-A)

(N=14)

Yes	7.1%
No	92.9%

SURVEY RESPONSE TO THE QUESTION

"What problems in maintenance, cleaning, obstruction of the tubes have you had?"
(Question III-B)

Not applicable (no pneumatic trash system)

No response

Not applicable (no pneumatic trash system)

Not applicable (no pneumatic trash system)

Not applicable (no pneumatic trash system)

Not applicable (no pneumatic trash system)

Not applicable (no pneumatic trash system)

Not applicable (no pneumatic trash system)

Does not apply (no pneumatic trash system)

No response

Not applicable (no pneumatic trash system)

Trash and linen chutes are in the new Phase III construction which will be completed in December 1981.

This is a new system. There were initial maintenance problems that resulted in a great deal of cleaning being required and occasional blockage of the system. These problems have diminished, but the screen requires continuous cleaning. The hospital does not use the tubes for waste removal from the Operating Rooms, Labor and Delivery, not for food products.

Not applicable (no pneumatic trash system)

SURVEY RESPONSE TO THE QUESTION

"Does your facility have a trash compactor used in conjunction with the contaminated waste removal?"

(Question III-C)

(N=14)

Yes 57.1%

No 42.9%

SURVEY RESPONSE TO THE QUESTION

"What problems in maintenance or cleaning of the compactor have you had?"
(Question III-D)

No response

The compactor is cleaned by DFAE.

Not applicable (no trash compactor)

[Trash compactor was noted to be used] only for general waste. The compactor itself [has suffered] break downs. Maintenance and cleaning was not a big problem. The contractor comes twice a week to haul off [debris] and returns in good shape.

Not applicable (no trash compactor)

Not applicable (no trash compactor)

Not applicable (no trash compactor)

[Trash compactor was noted to be used] only for administrative trash. The compactor has had no problems.

We have difficulty in cleansing and disinfecting the trash container. We also have some problems with insects at the trash container in the summer.

We have several small compactors. [Problems we have experienced include the following: compactor] cubes and doors break often (every two months), hard to clean the top of the ram [which] causes odor problems, increases in the number of needle sticks due to too full bags, takes two people to operate. Suggest the use of one large outside compactor.

Not applicable (no trash compactor)

[Problems we have experienced include the following:] frequently fills on weekends and is not emptied until Monday morning (this leaves trash piled up outside), inappropriate items placed in compactor (examples include mattress, small items of equipment), door is sometimes not closed and rodents or [other] animals drawn (one time a cat was compacted), inside of compactor is never cleaned, needs concrete pad [because] asphalt is continuously breaking and crumbling from the weight and moisture, too many people operate it without proper instructions.

Initially, a great deal of time has been required to clean the compactor. The problems relate back to the trash tubes.

None

APPENDIX 0

ANALYSIS OF NARRATIVE RESPONSE QUESTIONS
FROM THE
CONTAMINATED WASTE/INFECTIONS CONTROL SURVEY

KEY WORD/PHRASE ANALYSIS OF THE QUESTION

"What is your facility's operating definition of contaminated waste?"
(Question I-A)

Word/Phrase	Number of Occurrences	Percentages of Responses with Word/Phrase (N=14)
Body Fluids/Exudates	5	35.7%
Blood	5	35.7%
Disposable	4	28.6%
[Elaborated Examples ie, Bandages, Needles]	4	28.6%
Excreta	6	42.9%
Exudates	3	21.4%
Fluids	2	14.3%
Food	1	7.1%
Infections/Communicable	5	35.7%
Infectious Waste	1	7.1%
Isolation	3	21.4%
Laboratory [Wastes]	8	57.1%
Materials with Microorganisms	5	35.7%
Medical Wastes	1	7.1%
Potential(ly)/Suspected	5	35.7%
[Respiratory Isolation]	5	35.7%
Secretions	5	35.7%
Septic	1	7.1%
Specimens	5	35.7%
Strict Isolation	1	7.1%
Surgical Waste	6	42.9%
Tissue	2	14.3%

KEY WORD/PHRASE ANALYSIS OF THE QUESTION

"What is your facility's operating definition of nosocomial infection?"

(Question I-B)

Word/Phrase	Number of Occurrences	Percentage of Responses with Word/Phrases (N=14)
After Admission	2	14.3%
After Period of Confinement	1	7.1%
Develops During Hospitalization	8	57.1%
Directly Related to Previous Admission	1	7.1%
During Hospitalization	8	57.1%
Hospital Acquired	1	7.1%
Invasion by Pathogenic Microorganisms	1	7.1%
Not Present or Incubating	11	78.6%

KEY WORD/PHRASE ANALYSIS OF THE QUESTION

"What problems in maintenance, cleaning, obstruction of the tubes have you had?"
(Question III-B)

Due to limited response (2) to this question, a key word/phrase analysis was felt to have little reliability with regard to trends.

KEY WORD/PHRASE ANALYSIS OF THE QUESTION

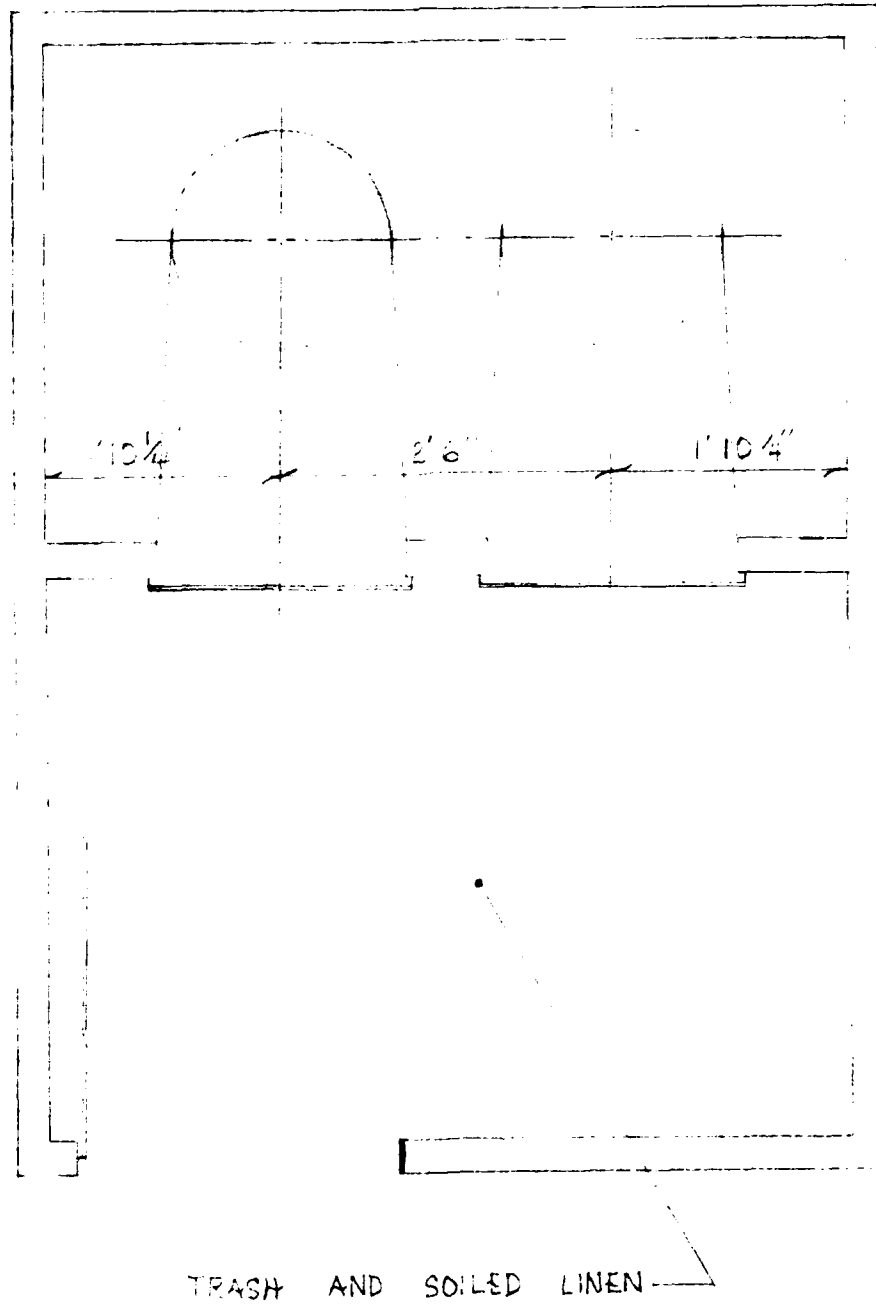
"What problems in maintenance or cleaning of the compactor have you had?"
(Question III-D)

<u>Word/Phrases</u>	<u>Number of Occurrences</u>	<u>Percentage of Responses with Word/Phrase (N=7)</u>
Asphalt [Foundation]	1	14.3%
Breakdowns	2	28.6%
Cleaning	6	85.7%
Contractor [Non-Organic Personnel]	2	28.6%
Disinfecting	1	14.3%
General/Admin Waste	2	28.6%
Inappropriate Items	1	14.3%
Insects	1	14.3%
Needle Sticks	1	14.3%
Not Closing Door	2	28.6%
Odor	1	14.3%
Operate Without Instructions	1	14.3%
Overfilled	1	14.3%
Rodents/Animals	1	14.3%

APPENDIX P

DIAGRAM OF TYPICAL PNEUMATIC TUBE ROOM

DIAGRAM OF TYPICAL PNEUMATIC TUBE ROOM



Note: Original Drawing by PFC Richard H. Kohl

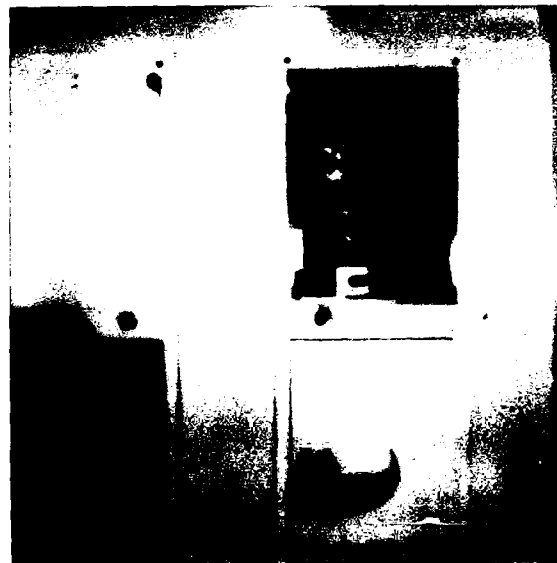
APPENDIX 4

PNEUMATIC TUBE ROOM



CORRIDOR VIEW OF TYPICAL
PNEUMATIC TUBE ROOM

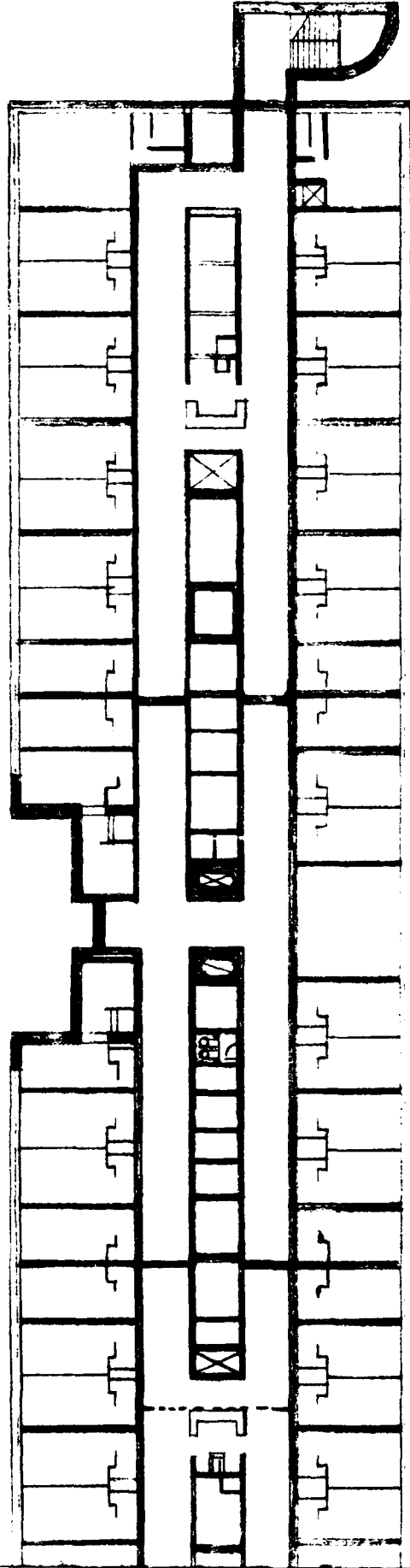
PNEUMATIC TUBE SYSTEM
ENTRY DOORS



APPENDIX R

TYPICAL FLOOR ARRANGEMENT
COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

TYPICAL FLOOR ARRANGEMENT
COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

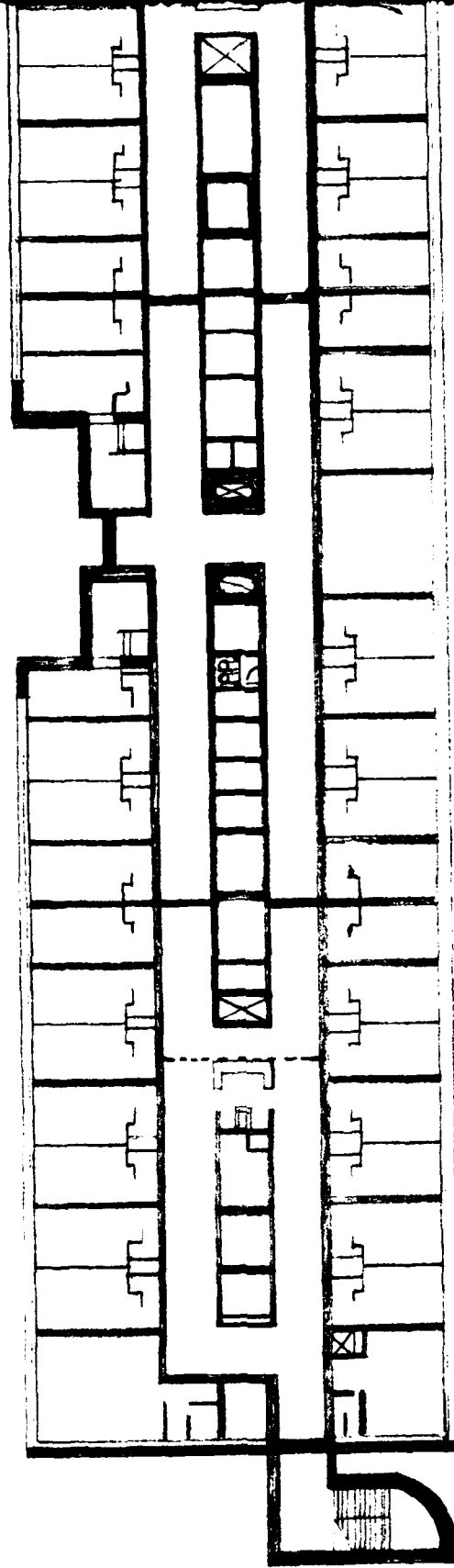


Utility Room
Rest Tube Room

Drawing by PFC Richard H. Kohl

TYPICAL FLOOR ARRANGEMENT

COL FLORENCE A. BLANCHFIELD ARMY COMMUNITY HOSPITAL

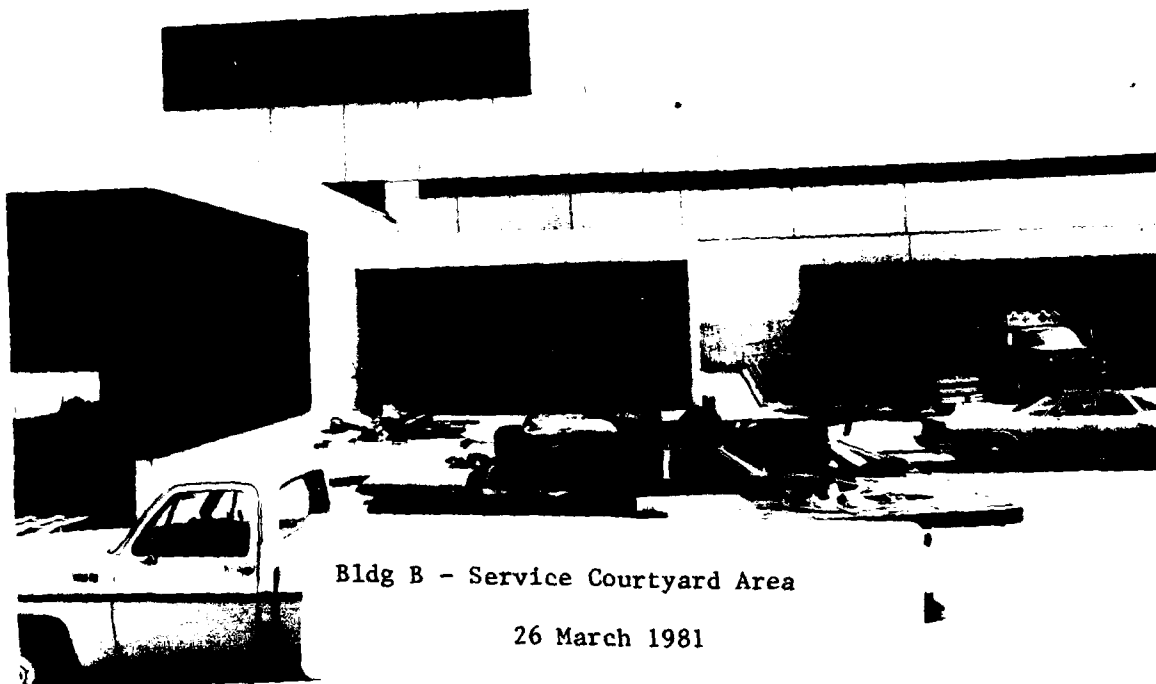


NOTE: A - Soiled Utility Room
B - Pneumatic Tube Room

Original Drawing by PFC Richard H. Kohl

APPENDIX S

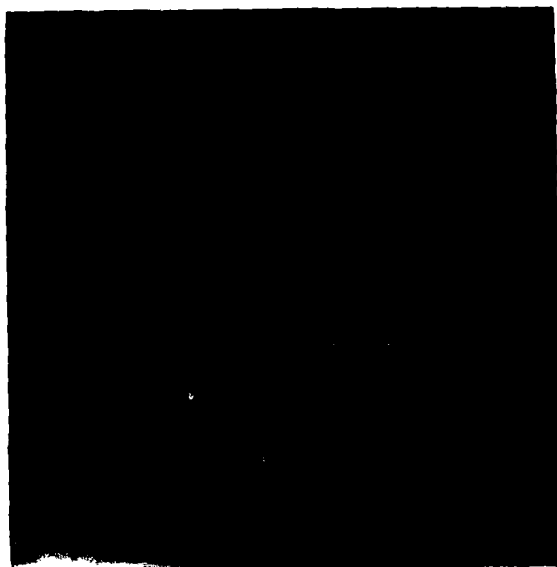
WASTE MANAGEMENT SERVICE AREA



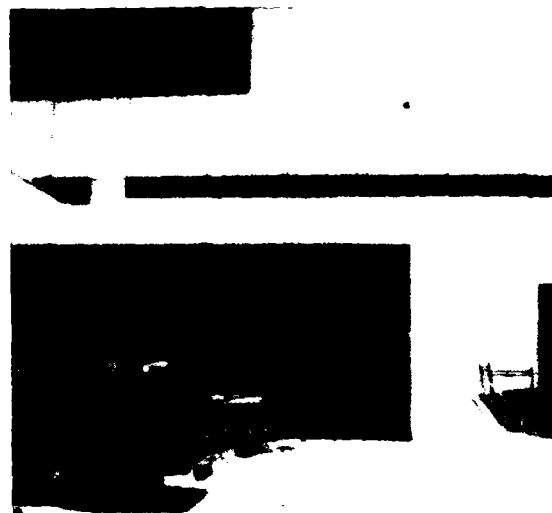
Bldg B - Service Courtyard Area

26 March 1981

WASTE REMOVAL DOCK (L) AND DELIVERY DOCK (R) AREA

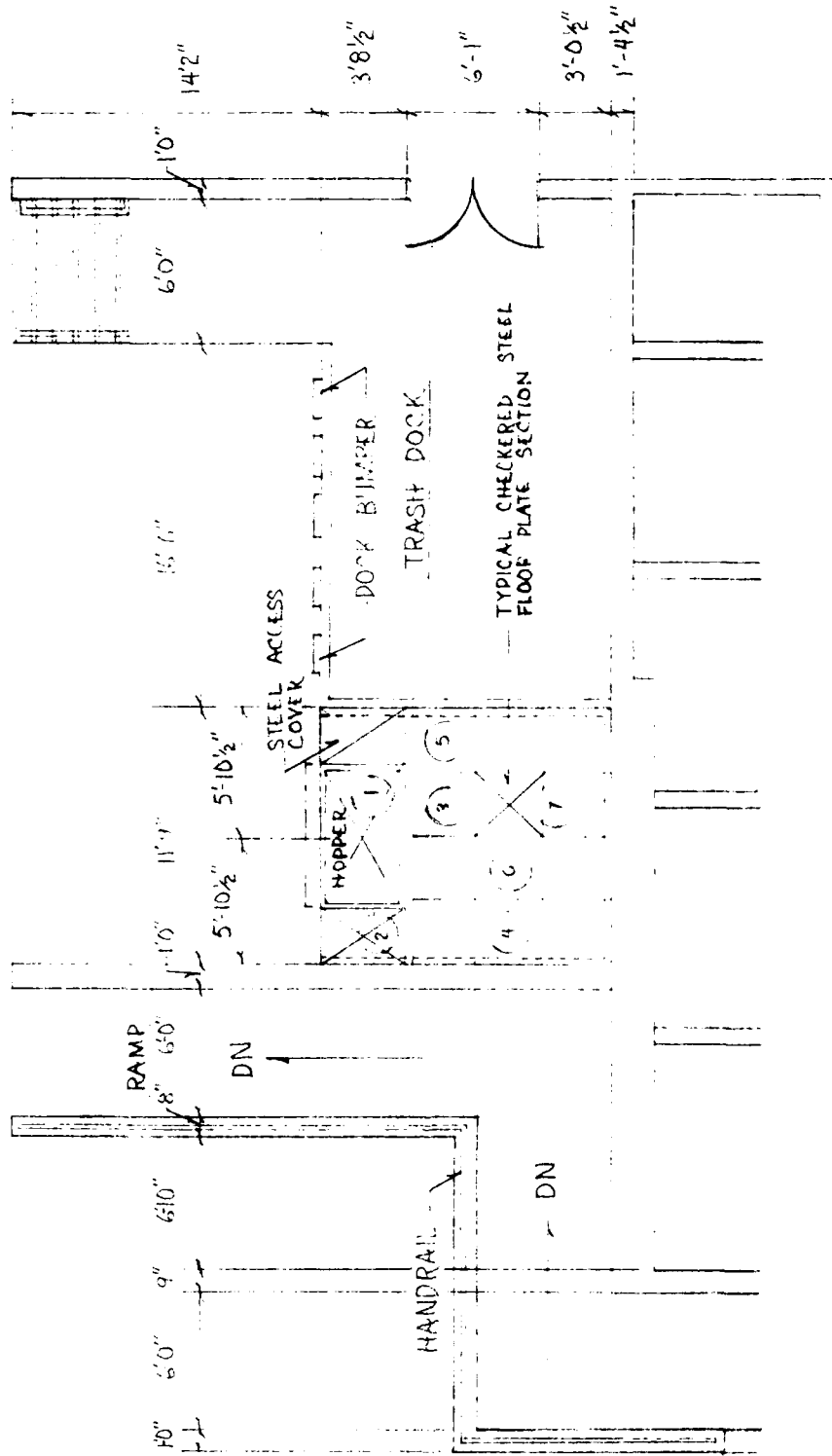


PNEUMATIC WASTE COLLECTION HOPPER



WASTE REMOVAL DOCK

WASTE REMOVAL DOCK AREA



Original drawing by PFC Richard H. Kohl

APPENDIX T
CONSENSUS SURVEY RESULTS

CONSENSUS SURVEY RESULTS

<u>Statement</u>		<u>Agree</u>	<u>Undecided</u>	<u>Disagree</u>
I	A	2	0	5*
	B	1	0	6*
	C	2	0	5*
	D	5*	0	2
	E	4*	0	3
	F	0	0	7*
	G	2	0	5*
	H	4*	0	3
II	A-1	3	0	4*
	A-2	2	0	5*
	A-3	0	0	7*
	A-4	1	1	5*
	B	2	0	5*
	C-1	0	0	7*
	C-2	1	0	6*
	C-3	0	0	7*
	C-4	0	0	7*
III	A-1	1	0	6*
	A-2	0	0	7*
	A-3	1	0	6*
	A-4	0	0	7*
	B	3	0	4*
	C-1	0	0	7*
	C-2	0	0	7*
	C-3	2	1	4*
	C-4	1	0	6*
IV	A	5*	0	2
	B	0	0	7*
	C	1	0	6*
	D	2	1	4*
	E	1	0	6*
	F	1	0	6*
	G	0	0	7*
	H	1	1	5*
	I	0	0	7*
	J	1	0	6*
	K	0	0	7*
	L	0	0	7*

CONSENSUS SURVEY RESULTS (CON'T)

<u>Statement</u>	<u>Agree</u>	<u>Undecided</u>	<u>Disagree</u>
V	5*	1	1
VI	5*	1	1
VII A	5*	0	2
B	4*	0	3
C	4*	1	2
D	1	0	6*
E	1	0	6*
F	1	0	6*
VIII A	5*	0	2
B	1	1	5*
C	1	0	6*
IX	6*	0	1
X	7*	0	0
XI	7*	0	0
XII	7*	0	0

NOTE. * Indicates simple question consensus.

APPENDIX U

FC MEDDAC REGULATION

*FC MEDDAC Reg _____

DEPARTMENT OF THE ARMY
Headquarters, Medical Department Activity
Fort Campbell, Kentucky 42223

Regulation
No. _____

Medical Services
CONTAMINATED WASTE MANAGEMENT

1. PURPOSE. The purpose of this regulation is to establish policies and procedures for effective collection, control, and disposal of contaminated waste.
2. SCOPE. This regulation is applicable to all Medical Department Activity personnel who deal with the generation, processing, movement, or disposal of contaminated waste. This includes all employees and contractual servants under control of contractors of the COL Florence A. Blanchfield Army Community Hospital involved in contaminated waste management.
3. EXPLANATION OF TERMS.
 - a. Contaminated/Infectious Waste. Any waste from patients on strict isolation, respiratory isolation procedures, waste from the microbiology laboratory, and surgical waste at the discretion of the operating room supervisor. This waste includes the following.
 - (1) All disposable bandages, dressings, hypodermic needles and syringes, cannulae, masks, sponges, tongue depressors, or other materials having come into contact with patients in the process of diagnosis or treatment regardless of whether clinical evidence of infection is present or not.
 - (2) All laboratory waste having the potential for communicability including tissues, used specimen cups, or culture media not capable of introduction to a sanitary sewer system.
 - (3) All wastes including patient secretions, exudates, blood or blood products.
 - b. Hospital Waste. All waste generated within a hospital which is not classified as infectious or pathological. It includes many items from general patient units, dental clinics, surgical section, emergency rooms, administrative office areas, or supply areas.

FC MEDDAC Reg _____

c. Incineration. That form of thermal degradation of materials such that infectious or pathological waste is reduced to harmless ash.

d. Pathological Waste. That waste which includes anatomical parts of humans or animals, excluding human corpses and animal carcasses.

e. Sanitary Landfill. That landfill which might be selected for use by the COL Florence A. Blanchfield Army Community Hospital which has appropriate license by the state environmental protection agency for operation.

f. Sharps. That item of medical use which possesses a point or blade capable of producing a puncture or cut to an unsuspecting person. This includes needles, knife blades, etc.

g. Waste. Any material which is to be discarded whether liquid or solid.

4. BACKGROUND. As greater attention is given to protection of the public health by control of hazardous waste materials, increased interest will be given to health care facilities and the contaminated waste management practiced within them. This is true due to the risk of pathogenic bacteria passage to the environment, and it's potential for movement through the community.

5. POLICIES.

a. All waste generated within the hospital environment should be handled with care so as to protect all patients, visitors, and staff from the effects of contamination.

b. Waste will be segregated within the COL Florence A. Blanchfield Army Community Hospital. This segregation will separate contaminated waste from hospital waste.

c. Contaminated waste will be bagged at the site of generation in red non-soluble plastic bags (minimum of 3 mil thickness) used as waste container liners. These liners will be tightly sealed with filament tape before leaving the area of generation.

d. Corrugated cardboard boxes, after being filled, will not be placed within the pneumatic tube system. It will be moved to the disposal site by other means.

FC MEDDAC Reg _____

e. Glass bottles will not be placed in pneumatic tube system for disposal. This includes intravenous solution bottles as well as Saline solution bottles.

f. The pneumatic tube system will be operated by housekeeping personnel so as not to take nursing personnel away from direct patient care. The tube rooms will be locked in order to preclude inappropriate items from being placed within the system.

g. Neither contaminated waste, nor pathological waste, will be placed in the pneumatic tube system.

h. Hospital waste, exclusive of cardboard boxes, will be placed in the pneumatic tube system. This waste will be bagged in opaque impervious plastic containers prior to placement in tube.

i. Pathological waste will be disposed of by Department of Pathology personnel.

6. RESPONSIBILITIES.

a. The Logistics Division is responsible for the following.

(1) Provide waste generating areas with waste holding containers of rigid material capable of thorough disinfection. One will be clearly marked CONTAMINATED WASTE in red letters or black letters on red contrast background.

(2) Provide waste generating areas a sufficient stock of red and opaque impervious plastic bags for waste collection.

(3) Insure housekeeping staff have adequate personal protective equipment prior to assuming duties in contaminated waste handling. This equipment includes heavy duty rubber gloves, full face mask, and gown.

(4) Insure housekeeping staff have been adequately trained in contaminated waste management policies and practices.

(5) Insure that waste generated within the hospital is removed on a timely basis to preclude excessive buildup of waste. Particular attention must be given to pickup during first and third shifts in all nursing care units.

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(6) Insure that no waste buildup occurs in either the hospital waste hopper area, or the contaminated/pathological waste incineration area.

(7) Insure compactor/dumpster area is properly washed down daily to prevent insect and rodent difficulties.

(8) Insure compactor door is kept secure to prevent unintentional compaction of materials or objects.

b. The Department of Nursing is responsible for the following.

(1) Insure that all nursing staff have been adequately trained in contaminated waste management policies and practices.

(2) Insure that all wastes are bagged and sealed at the point of generation. Contaminated waste will be double bagged and sealed with filament tape in order to prevent leakage.

(3) Establish departmental procedures for waste management in consultation with the hospital Executive Housekeeper.

c. Outpatient clinic chiefs are responsible for the following.

(1) Insure all assigned clinic personnel, coming into contact with contaminated waste, have been adequately trained in contaminated waste management policies and practices.

(2) Establish clinic procedures for waste management in consultation with the hospital Executive Housekeeper.

d. The Pathology Department is responsible for the following.

(1) Insure all laboratory staff have been adequately trained in contaminated waste management policies and practices.

(2) Establish departmental procedures for waste management in consultation with the hospital Executive Housekeeper.

e. The Preventive Medicine Activity is responsible for the following regarding contaminated/infectious, pathological, and hospital wastes.

(1) Monitor the waste generation practices utilized within the facility.

(2) Monitor the movement of waste through the facility.

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(3) Monitor the storage and disposal of waste from the buildings.

7. GENERATION AND COLLECTION.

a. Contaminated Waste.

(1) Units and activities which generate infectious waste will store the waste in the area of generation until collected. Containers with tight fitting lids and lined with red non-soluble plastic bags (3 mil thickness minimum) will be used in the area of generation.

(2) Container liners will be tightly sealed with tape before leaving the area of generation.

(3) The waste will be collected at regular intervals by medical treatment facility personnel trained in proper collection and handling procedures.

b. Pathological Waste.

(1) Areas that generate pathological waste will be handle the waste as outlined in 7a above.

(2) When storage of pathological waste is necessary, the inclosed waste will be placed under refrigeration until it is transferred for treatment.

c. Hospital Waste.

(1) Areas generating hospital waste will store the waste in the area of generation until collected. Containers with tight fitting lids and lined with opaque non-soluble plastic bags (3 mil thickness minimum) will be used in the area of generation.

(2) Container liners will be tightly sealed with tape prior to collection.

(3) The waste will be collected at regular intervals by medical treatment facility personnel trained in proper collection and handling procedures.

8. TRANSPORTATION WITHIN THE HOSPITAL.

a. Contaminated Waste.

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(1) Contaminated Waste will be transported in the original container or the sealed bags can be transferred to larger plastic carts.

(2) Contaminated waste will be manually transported to the incinerator for treatment.

(3) Carts used to transport contaminated waste will be of a type that can be easily cleaned and that will not disclose their contents. Containers and carts will be cleaned after each use.

(4) Routes used for transporting infectious waste within the MTF will be carefully selected to minimize patient and personnel exposure and congestion. Patient waiting areas will not be traversed for waste removal.

b. Pathological Waste. Pathological waste will be transported and handled the same as infectious waste in paragraph 8a.

c. Hospital Waste.

(1) Hospital waste will be transported within the hospital unit or floor as discussed in paragraph 8a. It will be moved from storage areas to the most proximate pneumatic tube room. This will be done after the sealed bags of waste have been placed in a larger opaque plastic bag and sealed.

(2) All hospital wastes will be taken to the central compactor collection point for subsequent compaction, removal and disposal at an approved sanitary landfill.

9. TREATMENT/DISPOSAL.

a. Contaminated Waste.

(1) Contaminated waste will be incinerated as the method of treatment to render the waste noninfectious.

(2) The ash, or noninfectious waste from treatment can be disposed at the sanitary landfill.

b. Pathological Waste.

(1) Pathological waste will be incinerated as the method of treatment.

(2) After incineration the ash can be disposed at the sanitary landfill.

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c. Hospital Waste.

(1) Hospital waste will be stored outside the hospital in leak-proof containers (dumpsters).

(2) Hospital waste will not be transferred from one container to another or to a compactor type truck.

(3) The containers (dumpsters) will be transported to the sanitary landfill and must be cleaned prior to return to the hospital.

d. Liquid Waste. Liquid waste (for example feces, urine, vomitus, and blood) will be disposed in the sanitary sewer. Care should be taken to insure that contamination of hospital personnel and the immediate environment does not occur during disposal. However, liquids from the microbiology laboratory will be steam sterilized prior to disposal in the sanitary sewer. Liquids from the surgical suite may require steam sterilization at the discretion of the operating room supervisor, prior to disposal via the sanitary sewer.

e. Needles, Syringes, and Sharps.

(1) All needles, syringes, and other sharps will be rendered unusable at the point of origin.

(2) They will be placed in a cardboard container specially designed for the purpose of safe storage of such items.

(3) These containers will be securely taped to prevent spillage and will be clearly labeled as to content.

(4) Once properly destroyed and placed in cardboard boxes, they will remain classified as contaminated waste. They will be disposed of as discussed in paragraph 9a.

10. REFERENCES. Attention is directed to the following references for additional guidance as may be required.

- a. AR 40-5, Health and Environment, 25 Sep 74.
- b. AR 40-61, Medical Logistics Policies and Procedures, 25 Feb 76.
- c. HSC Supplement 1 to AR 40-5, SAB.
- d. 1981 Accreditation Manual for Hospitals, Joint Commission on Accreditation of Hospitals, 1980.
- e. Infection Control in the Hospital, American Hospital Association, 1979.

FC MEDDAC Reg _____

f. Guide to Prevention and Control of Hospital Associated Infections,
US Army Environmental Hygiene Agency, August, 1979.

g. Isolation Techniques for Use in Hospitals, US Department of Health,
Education, and Welfare, 2nd Ed., 1975.

SELECTED BIBLIOGRAPHY

Books

- Accreditation Manual for Hospitals. 1981 Edition. Chicago: 1980.
- American Hospital Association. Infection Control in the Hospital. Chicago, 1979.
- Barrett-Conner, Elizabeth, et al. Epidemiology for the Infection Control Nurse. Saint Louis: The C. V. Mosby Company, 1978.
- Berry, Edna Cornelia, and Kohn, Mary Louise. Introduction to Operating-Room Technique. New York: McGraw-Hill Book Company, 1972.
- Bond, R. G.; Straub, C. P.; and Prober, R. Handbook of Environmental Control - Solid Waste. Vol 2 Cleveland: The Chemical Rubber Co., 1973.
- Bond, Richard G.; Michaelson, George S.; and DeRoos, Roger L. Environmental Health and Safety in Health-Care Facilities. New York: Macmillan Publishing Co., Inc., 1973.
- Cundy, Kenneth R., and Ball, William. Infection Control in Health Care Facilities: Microbiological Surveillance. Baltimore: University Park Press, 1977.
- DeRoos, Roger L., and Michaelson, George S. "Solid Wastes: Handling and Disposal." Environmental Health and Safety in Health-Care Facilities. ed. by Richard G. Bond, George S. Michaelson, and Roger L. DeRoos. New York: Macmillan Publishing Co., Inc., 1973.
- Dubay, Elaine C., and Grubb, Reba Douglass. Infection Prevention and Control. Saint Louis: The C. V. Mosby Company, 1978.
- Golueke, Clarence G. Biological Reclamation of Solid Wastes. Emmaus, Pennsylvania: Rodale Press, 1977.
- Gordon, Judith G., et al. Disposal of Hospital Wastes Containing Pathogenic Organisms. McLean, Virginia: The Mitre Corporation, 1979.
- Iglar, Albert F., and Bond, Richard G. Hospital Solid Waste Disposal in Community Facilities. Minneapolis: University of Minnesota, 1971.
- Koren, Herman. Environmental Health and Safety. New York: Pergamon Press, Inc., 1974.

- Litsky, Bertha Yanis. Hospital Sanitation-An Administrative Program. Chicago: Clissold Publishing Company, 1968.
- Lowbury, E. J. L., et al. Control of Hospital Infection. New York: John Wiley and Sons, 1975.
- Mausner, Judith S., and Bahn, Anita K. Epidemiology-An Introductory Text. Philadelphia: W. B. Saunders Company, 1974.
- Pavonii, J. L.; Hur, John E.; and Hagerty, D. Joseph. Handbook of Solid Waste Disposal Materials and Energy Recovery. New York: Van Nostrand Reinhold Co., 1975.
- Senn, C. L., et al. Hospital Wastes Management Study of Los Angeles County. University of Southern California Medical Center. Los Angeles: U.S.C. 1974.
- Sartwell, Philip E. Preventive Medicine and Public Health. New York: Appleton-Century-Crofts, 1973.

Articles

- "Administrator's Bulletin." Kentucky Hospital Association, Vol 6 (December 5, 1960).
- Ashton, Kate. "Our Dirty Hospitals." Nursing Times, Vol. 75 (June 21, 1979), 1035.
- Ayliffer, G. A. J., et al. "A Unit for Source and Protective Isolation in a General Hospital." British Medical Journal, Vol. 2 (August 25, 1979), 461-465.
- Barlow, P. J. "Hospital Waste Disposal." Environmental Health, (March, 1972), 76-76.
- Chelgren, Gladys, and LaForce, Marc F. "Limited, Periodic Surveillance Proves Practical and Effective." Hospitals, Vol. 52 (March 16, 1978), 151-154.
- Collins, Thomas M. "Legal Aspects of Pollution Control." Hospitals, Vol. 46 (October 16, 1972), 119-124.
- Courier-Journal (Louisville, Kentucky), January 1, 1981.
- Dixon, Richard E. "Nosocomial Infection, A Continuing Problem." Postgraduate Medicine, Vol. 62 (August, 1977), 95-100.

- Eickhoff, Theodore C. "Hospital Infections." Disease-A-Month, (September, 1972), 3-40.
- _____. "Standards for Hospital Infection Controls." Annals of Internal Medicine, Vol. 89 (November, 1978), 829-831.
- Elwell, Joyce Michaels. "The Constant Threat of Nosocomial Infection." The Journal of Nursing Care, (April, 1979), 22-23.
- Engley, Frank B., Jr. "Biological Interrelationships." Hospitals, Vol. 46 (October 16, 1972), 83-85, 88, 89.
- Freeman, Jonathan, and McGowan, John E. Jr., "Risk Factors for Nosocomial Infection." Journal of Infectious Diseases, Vol. 138, N6, (December, 1978), 811-819.
- Geelhoed, Glenn W. "Isolate The Infection, Not the Patient." Association of Operating Room Nurses Journal, Vol. 28 (July, 1978), 55-61.
- Hammond, Margaretta A. "Refuse Disposal - 1978." Nursing Times, (December 7, 1978), 8-9.
- "Hazardous Waste Management System: General." Federal Register, Vol. 45 (May 19, 1980), 33066-33123.
- "Hazardous Waste Regulations." Federal Register, Vol. 45 (November 24, 1980), 77872-77876.
- "Hazardous Wastes: A Matter of Definition." Chemical and Engineering News, Vol. 58 (June 16, 1980), 21-22.
- "Hazardous Wastes Technology is Available." Science, Vol. 204 (June 1, 1979), 930-934.
- Jain, Jiya L.; Arora, Sant R.; and Bond, Richard G. "Integrated Approach Eliminates Waste." Hospitals, Vol. 46 (October 16, 1972), 105-110.
- Katz, Elizabeth. "Keeping Up With Infection Control." Dimensions in Health Service. (April, 1978), 21-22.
- Laundsby, Ernest E. "Infection Control: Does Your Program Measure Up?" Executive Housekeeper. (June, 1979), 8-9, 13.

- Litsky, Bertha Yanis. "Microbiology and Postoperative Infections." Journal of the Association of Operating Room Nurses, Vol. 19 (January, 1974), 37-52.
- Mackey, Christine, and Hopefl, Alan W. "Keeping Infections Down When Risks Go Up." Nursing 80, Vol. 10 (June, 1980), 69-73.
- Maki, Dennis G. "Control of Colonization and Transmission of Pathogenic Bacteria in the Hospital." Annals of Internal Medicine, Vol. 89 (November, 1978), 777-780.
- Marriott, John. "Hospital Solid Wastes." Royal Society of Health Journal, Vol 98, N5, (October, 1978), 209-215.
- Norris, Frances S., and Young, B. G. "Guidelines for Defining and Disposing of Medical Waste." Aviation, Space and Environmental Medicine, (January, 1978), 81-85.
- Oviatt, Vinson R. "Environmental Health Concerns." Hospitals, Vol. 47 (April 1, 1973), 83-85, 88, 90.
- Pfaff, Sandra J. "How Infection Control Can Meet Standards." Hospitals, Vol. 53 (August 16, 1979), 119-125.
- Pollock, Eugene L. "Use of One-Time Materials and Equipment Increases Hospital Refuse." Solid Wastes Management, Vol. 21 (October, 1978), 82 98, 100.
- Porter, David. "Infection Control in Hospitals." New Zealand Hospital, (November, December 1978), 13, 15, 17.
- Prentice, Gwen M. "Hospital Infections." Nursing Times, (June 29, 1978), 1090-1091.
- Reinarz, James Allen. "Nosocomial Infections." Clinical Symposia, Vol. 30 (1978), 2-30.
- Schaffner, William. "Infection Control: Time to Justify the Costs." Hospitals, Vol. 53 (April 1, 1979), 125-130.
- Smith, Philip W.; Stoess, Paul A.; Rusnak, Patricia G. "Infection Control in Hospitals: Current Trends and Requirements." Nebraska Medical Journal, (March, 1979), 62-65.

"The Case of the Leg That Turned Up in the Dustbin." Health and Social Service Journal, Vol. 89 N-4646 (June 15, 1979), 720-721.

Wallace, L. P.; Zaltzman, R; and Burchinal, J. C. "Where Solid Waste Comes From; Where It Should Go." Modern Hospital, Vol. 118 (February, 1972) 92-95.

Williams, Walter E. "Hospital Engineering." Hospitals, Vol. 47 (April 1, 1973), 93-98.

"When Is Infectious Waste Not Infectious Waste?" Hospitals, Vol. 46 (May 1, 1972), 56, 60, 64, 65.

Government Reports

Kentucky. Department for Human Resources, Certificate of Need and Licensure Board. "Hospital Facilities - Construction and Alteration." 1980.

Kentucky State Health Plan. September, 1980.

National Technical Information Service. Solid Waste Handling and Disposal in Multistory Buildings and Hospitals. Vol 2: Observations of Local Practices. Springfield, Virginia, 1972.

National Technical Information Service. Solid Waste Handling and Disposal in Multistory Buildings and Hospitals. Vol 1: Summary, Conclusions, and Recommendations. Springfield, Virginia, 1972.

Public Administration Service. Municipal Refuse Disposal, prepared by Institute for Solid Wastes, 1970.

Tennessee. Department of Public Health, Division of Solid Waste Management. Emergency Rules Governing Hazardous Waste Management in Tennessee. 1980.

Tennessee. Tennessee Solid Waste Disposal Control Board. Emergency Rules Governing Hazardous Waste Management in Tennessee, October 31, 1980, .01-3.

Tennessee Code Annotated. Solid Waste Disposal, Vol. 9B, 1977, 527-545.

Tennessee Code Annotated. Hazardous Substances Act, Vol. 9B, 1977, 494-504.

Tennessee Code Annotated. Solid Waste Disposal, 1980, 152-166.

United States Army Health Services Command. Fact Sheet on Hospital Wastes, HSC Commanders Conference, Fort Sam Houston, Texas, 1980.

United States Army Health Services Command. "Hospital Wastes." Fort Sam Houston, Texas, January, 1981.

- United States Army Environmental Hygiene Agency. Guide to the Prevention and Control of Hospital-Associated Infections, by James B. Hammond. Aberdeen Proving Ground, Maryland, 1979.
- United States Department of Health, Education and Welfare. Public Health Service, Center for Disease Control. Isolation Techniques for Use in Hospitals, 1975.
- United States Environmental Hygiene Agency. Medical Facility Solid Waste Management, by Kenneth P. Stachiew. Aberdeen Proving Ground, Maryland, 1976.
- United States Environmental Protection Agency. Hazardous Waste - A Guide for Obtaining Permits and Authorization for State Programs. Washington, 1979.
- United States Environmental Protection Agency. Hazardous Waste Generation and Commercial Hazardous Waste Management Capacity - An Assessment. (SW-894), December 1980.
- United States Environmental Protection Agency. Solid Waste Management - Hazardous Waste, 1979.
- United States Public Health Service. Center for Disease Control. Guidelines From The Center For Disease Control - Safe Disposal of Solid Wastes From Hospitals. June, 1980.

Interviews

- Dampier, Robert. Assistant Administrator, Regional Medical Center of Hopkins County, Madisonville, Kentucky, interview held February 20, 1981.
- Downs, Mrs. Alberta. Director of Nursing, Grayson County Hospital, Leitchfield, Kentucky, interview held February 14, 1981.
- Herek, Robert, COL. Chief, Facilities Division, Office of The Deputy Chief of Staff for Logistics, USA Health Services Command, Fort Sam Houston, Texas, interview held December 1, 1980.
- Mallerson, J. Center for Disease Control, Hospital Infections Branch, interview held November 24, 1980.
- Meriwether, Betty, CAPT. USN, Chief Professional Services. USA Community Hospital, Fort Campbell, Kentucky, interview held February 10, 1981.
- McConnell, Douglas H., M.D., Major. General Surgery Service, Department of Surgery. United States Army Community Hospital, Fort Campbell, Kentucky, interview held March 12, 1981.

Monroe, Mike, CPT. Waste Disposal Engineering Division, U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland, interview held February 6, 1981.

Mumford, Richard P. Executive Housekeeper, USA Community Hospital, Fort Campbell, Kentucky, interviews held September 22, 1980; November 19, 1980; April 22, 1981.

Peacock, James, LTC. Deputy Director Health Facility Planning Agency, Washington, D.C., interview held December 17, 1980.

Sargent, Martin, LTC. Project Officer, COL Florence A. Blanchfield Army Community Hospital, Fort Campbell, Kentucky, interview held February 25, 1981.

Seufert, Helen, COL. Infection Control Consultant, Office Of The Surgeon General, U.S. Army, interview held January 29, 1981.

Trevino, Sylvia. Program Analyst, Resources Coordination and Analysis Division, Office of Deputy Chief of Staff Comptroller, USA Health Services Command, Fort Sam Houston, Texas, interview held April 6, 1981.

Other

American Hospital Association. "EPA Hazardous Waste Regulations Update Summary and Recommendations." Letter to Institutional Members, Chicago: January 1981.

Regional Medical Center of Hopkins County. Memorandum For Record, February 20, 1981.

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