



National Institute of Justice

Law Enforcement and Corrections Standards and Testing Program

Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders

NIJ Guide 103-00

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October 2001**

ABOUT THE LAW ENFORCEMENT AND CORRECTIONS STANDARDS AND TESTING PROGRAM

The Law Enforcement and Corrections Standards and Testing Program is sponsored by the Office of Science and Technology of the National Institute of Justice (NIJ), U.S. Department of Justice. The program responds to the mandate of the Justice System Improvement Act of 1979, directed NIJ to encourage research and development to improve the criminal justice system and to disseminate the results to Federal, State, and local agencies.

The Law Enforcement and Corrections Standards and Testing Program is an applied research effort that determines the technological needs of justice system agencies, sets minimum performance standards for specific devices, tests commercially available equipment against those standards, and disseminates the standards and the test results to criminal justice agencies nationally and internationally.

The program operates through:

The *Law Enforcement and Corrections Technology Advisory Council (LECTAC)*, consisting of nationally recognized criminal justice practitioners from Federal, State, and local agencies, which assesses technological needs and sets priorities for research programs and items to be evaluated and tested.

The *Office of Law Enforcement Standards (OLES)* at the National Institute of Standards and Technology, which develops voluntary national performance standards for compliance testing to ensure that individual items of equipment are suitable for use by criminal justice agencies. The standards are based upon laboratory testing and evaluation of representative samples of each item of equipment to determine the key attributes, develop test methods, and establish minimum performance requirements for each essential attribute. In addition to the highly technical standards, OLES also produces technical reports and user guidelines that explain in nontechnical terms the capabilities of available equipment.

The *National Law Enforcement and Corrections Technology Center (NLECTC)*, operated by a grantee, which supervises a national compliance testing program conducted by independent laboratories. The standards developed by OLES serve as performance benchmarks against which commercial equipment is measured. The facilities, personnel, and testing capabilities of the independent laboratories are evaluated by OLES prior to testing each item of equipment, and OLES helps the NLECTC staff review and analyze data. Test results are published in Equipment Performance Reports designed to help justice system procurement officials make informed purchasing decisions.

Publications are available at no charge through the National Law Enforcement and Corrections Technology Center. Some documents are also available online through the Internet/World Wide Web. To request a document or additional information, call 800-248-2742 or 301-519-5060, or write:

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Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders

NIJ Guide 103-00 Volume II

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We wish to acknowledge the Interagency Board (IAB) for Equipment Standardization and Interoperability. The IAB (made up of government and first responder representatives) was commissioned by the Attorney General of the United States in conjunction with the Department of Defense’s Director of Military Support. The IAB was established to ensure equipment standardization and interoperability and to oversee the research and development of advanced technologies to assist first responders at the State and local levels in establishing and maintaining a robust crisis and consequence management capability.³

We also sincerely thank all vendors who provided us with information about their products.

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³The Marshall Convention, Standardized Weapons of Mass Destruction (WMD) Response Force Equipment and InterOperability, 2 to 4 November 1999.

FOREWORD

The Office of Law Enforcement Standards (OLES) of the National Institute of Standards and Technology (NIST) furnishes technical support to the National Institute of Justice (NIJ) program to support law enforcement and criminal justice in the United States. OLES's function is to develop standards and conduct research that will assist law enforcement and criminal justice agencies in the selection and procurement of quality equipment.

OLES is: (1) subjecting existing equipment to laboratory testing and evaluation, and (2) conducting research leading to the development of several series of documents, including national standards, user guides, and technical reports.

This document covers research conducted by OLES under the sponsorship of NIJ. Additional reports as well as other documents are being issued under the OLES program in the areas of protective clothing and equipment, communications systems, emergency equipment, investigative aids, security systems, vehicles, weapons, and analytical techniques and standard reference materials used by the forensic community.

Technical comments and suggestions concerning this guide are invited from all interested parties. They may be addressed to the Office of Law Enforcement Standards, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8102, Gaithersburg, MD 20899–8102.

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COMMONLY USED SYMBOLS AND ABBREVIATIONS

A	ampere	H	Hour	Ω	ohm
ac	alternating current	Hf	high frequency	p.	page
AM	amplitude modulation	Hz	Hertz	Pa	pascal
cd	candela	i.d.	inside diameter	pe	probable error
cm	centimeter	In	Inch	pp.	pages
CP	chemically pure	IR	Infrared	ppm	parts per million
c/s	cycle per second	J	Joule	qt	quart
d	day	L	Lambert	rad	radian
dB	decibel	L	Liter	rf	radio frequency
dc	direct current	Lb	Pound	rh	relative humidity
$^{\circ}\text{C}$	degree Celsius	Lbf	pound-force	s	second
$^{\circ}\text{F}$	degree Fahrenheit	Lbf \cdot in	pound-force inch	SD	standard deviation
dia	diameter	Lm	Lumen	sec.	section
emf	electromotive force	Ln	logarithm (base e)	SWR	standing wave ratio
eq	equation	μ	Micron	uhf	ultrahigh frequency
F	farad	Min	Minute	UV	ultraviolet
fc	footcandle	Mm	Millimeter	V	volt
fig	figure	Mo	Month	vhf	very high frequency
FM	frequency modulation	Mph	miles per hour	W	watt
ft	foot	M/s	meter per second	λ	wavelength
ft/s	foot per second	N	Newton	wk	week
g	acceleration	N \cdot m	newton meter	wt	weight
g	gram	Nm	Nanometer	yr	year
gal	gallon	No.	Number		
H	henry	o.d.	outside diameter		

area=unit² (e.g., ft², in², etc.); volume=unit³ (e.g., ft³, m³, etc.)

ACRONYMS SPECIFIC TO THIS DOCUMENT

BW	Biological Warfare	MDS	Modular Decontaminating System
CARC	Chemical Agent Resistant Coatings	NFPA	National Fire Protection Association
CB	Chemical and Biological	NIJ	National Institute of Justice
CW	Chemical Warfare	OWR	Odenwald-Werke Rittersbach
DAP	Decontaminating Apparatus	PPE	Personal Protection Equipment
DEDAS	Decontamination Emulsion Direct Application	PSI	Pounds per Square Inch
DETA	Diethylenetriamine	RFAS	Russian Federation and Associated States
DPG	Dugway Proving Grounds	RSDL	Reactive Skin Decontaminant Lotion
DS2	Decontaminating Solution 2	SCFM	Standard Cubic Feet per Minute
EGME	Ethylene Glycol Monomethylether	SDK	Skin Decontamination Kit
EOD	Explosive Ordnance Disposal	SS-GLCS	Supersonic Gas/Liquid Cleaning System
HVS	High Volume Sprayer	STB	Super Tropical Bleach
IDLH	Immediately Dangerous to Life and Health	TICs	Toxic Industrial Chemicals
IAB	Interagency Board	TIMs	Toxic Industrial Materials
LDS	Liquid Decontaminant Soap	TSWG	Technical Support Working Group
NFPA	National Fire Protection Association	WPU	Water Purification Unit

PREFIXES (See ASTM E380)

d	Deci (10 ⁻¹)	da	deka (10)
c	Centi (10 ⁻²)	h	hecto (10 ²)
m	Milli (10 ⁻³)	k	kilo (10 ³)
μ	Micro (10 ⁻⁶)	M	mega (10 ⁶)
n	Nano (10 ⁻⁹)	G	giga (10 ⁹)
p	Pico (10 ⁻¹²)	T	tera (10 ¹²)

COMMON CONVERSIONS

0.30480 m = 1 ft	4.448222 N = 1 lbf
2.54 cm = 1 in	1.355818 J = 1 ft \cdot lbf
0.4535924 kg = 1 lb	0.1129848 N m = 1 lbf \cdot in
0.06479891 g = 1 gr	14.59390 N/m = 1 lbf/ft
0.9463529 L = 1 qt	6894.757 Pa = 1 lbf/in ²
3600000 J = 1 kW \cdot hr	1.609344 km/h = 1 mph
psi = mm of Hg x (1.9339 x 10 ⁻²)	
mm of Hg = psi x 51.71	

Temperature: $T_{\text{C}} = (T_{\text{F}} - 32) \times 5/9$

Temperature: $T_{\text{F}} = (T_{\text{C}} \times 9/5) + 32$

ABOUT THIS REPORT

The National Institute of Justice (NIJ) is the focal point for providing support to State and local law enforcement agencies in the development of counterterrorism technology and standards, including technology needs for chemical and biological defense. In recognizing the needs of State and local emergency first responders, the Office of Law Enforcement Standards (OLEs) at the National Institute of Standards and Technology (NIST), working with NIJ, the Technical Support Working Group (TSWG), the U.S. Army Soldier and Biological Chemical Command (SBCCOM), and the Interagency Board, is developing chemical and biological defense equipment guides. The guides will focus on chemical and biological equipment in areas of detection, personal protection, decontamination, and communication. This document focuses specifically on chemical and biological agent decontamination equipment and was developed to assist the emergency first responder community in the evaluation and purchase of decontamination equipment.

The long range plans are to: (1) subject existing decontamination equipment to laboratory testing and evaluation against a specified protocol, and (2) conduct research leading to the development of multiple series of documents, including national standards, user guides, and technical reports. It is anticipated that the testing, evaluation, and research processes will take several years to complete; therefore, NIJ has developed this initial guide for the emergency first responder community, in order to facilitate their evaluation and purchase of decontamination equipment.

In conjunction with this program, additional guides, as well as other documents, are being issued in the areas of chemical agent and toxic industrial material detection equipment, biological agent detection equipment, personal protective equipment, medical kits and equipment, and communications equipment used in conjunction with protective clothing and respiratory equipment.

This specific work is Volume II of the Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders. It contains the information data sheets that were used to support the decontamination equipment evaluation detailed in Volume I. The compilation of data in Volume II is the result of the merger of several data acquisition methods used independently by NIST and TSWG.

The information contained in this guide has been obtained through literature searches and market surveys. The vendors were contacted multiple times during the preparation of this guide to ensure data accuracy. In addition, the information is supplemented with test data obtained from other sources (e.g., Department of Defense), if available. It should also be noted that the purpose of this guide is not to provide recommendations, but rather to serve as a means to provide information to the reader to compare and contrast commercially available decontamination equipment. *Reference herein to any specific commercial products, processes, or services by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government. The information*

and statements contained in this guide shall not be used for the purposes of advertising, nor to imply the endorsement or recommendation of the United States Government.

With respect to information provided in this guide, neither the United States Government nor any of its employees make any warranty, express or implied, including but not limited to the warranties of merchantability and fitness for a particular purpose. Further, neither the United States Government nor any of its employees assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed.

Technical comments, suggestions, and product updates are encouraged from interested parties. They may be addressed to the Office of Law Enforcement Standards, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8102, Gaithersburg, MD 20899–8102. It is anticipated that this guide will be updated periodically.

Questions relating to the specific devices included in this document should be addressed directly to the proponent agencies or the equipment manufacturers. Contact information for each equipment item included in this guide can be found in this volume (Vol. II).

1. INTRODUCTION

This guide includes information intended to be useful to the emergency first responder community in the selection of chemical and biological agent and toxic industrial material decontamination techniques and equipment for different applications. This specific work, Volume II of the *Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders*, includes details on the 72 decontamination equipment items that are referenced in Volume I.

The *Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders* includes information intended to assist the emergency responder community select decontamination equipment. Due to the large number of decontamination equipment items identified for the guide, the guide is separated into two volumes. Volume I serves as the selection tool, while Volume II serves as a repository for the decontamination equipment data sheets.

This specific work represents Volume II of the *Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders*. Volume II includes three sections and five appendices. Section 1 is the introduction. Section 2 discusses the market survey that was conducted to identify the 72 commercially available decontamination equipment items. Section 3 provides a description of the 36 data fields that were identified for providing information relating to the equipment. Appendix A lists the sources that were used in developing this document. Appendix B sequentially indexes the equipment by decontamination equipment identification number and includes the manufacturers. Appendix C alphabetically indexes the equipment by decontamination equipment name. Appendix D alphabetically indexes the decontamination equipment by the manufacturer names. Appendix E contains the data sheets for each item of decontamination equipment.

2. MARKET SURVEY

An extensive market survey was conducted to identify commercially available decontamination equipment including the assessment of past market surveys, identification of new equipment, and interaction with numerous equipment vendors. Section 2.1 provides a summary of the assessment of previous market surveys. Section 2.2 provides the identification of new and updated equipment, and section 2.3 provides a summary of information obtained through interfacing with the vendors.

2.1 Past Market Survey

A previously conducted market survey (*Wide Area Decon: CB Decontamination Technologies, Equipment and Projects*) was reviewed during the development of this guide and is listed in appendix A.

The review of this document resulted in the inclusion of approximately 55 decontamination equipment items within this guide.

2.2 Identification of New Equipment

A variety of techniques were utilized to identify new decontamination equipment, including a Commerce Business Daily (CBD) Announcement, literature searches, database searches, Internet searches, technical conferences, and technical contacts. These techniques resulted in the identification of 17 additional decontamination equipment items.

2.3 Vendor Contact

Vendors were contacted at two separate times in order to obtain additional information, as well as to finalize their specific equipment data for inclusion in the guide. The first contact occurred in the last quarter of 1999. Each of the vendors received a facsimile or an electronic mail message containing the data sheets for their specific equipment item(s). They were asked to identify missing data and certify the accuracy of the existing data.

The second contact was made during the first week of May 2000. Each vendor received a facsimile or an electronic mail message that contained the data sheets for their specific equipment item(s), the selection factors that were developed to assist with the selection and purchase of the most appropriate equipment, and the results of the evaluation of the decontamination equipment against the selection factors. The vendors were asked to review the data sheets and tables for completeness and accuracy of the incorporated data.

3. DATA FIELDS

Appendix D lists 72 commercially available chemical and biological (CB) agent decontamination equipment items. Thirty-six data fields, as defined in this section, were used for providing information relating to the decontamination equipment. It is important to note that these data fields were developed using input from the emergency responder community.

The data fields are organized into five categories:

- General.
- Operational parameters.
- Physical parameters.
- Logistical.
- Special requirements.

The remainder of this section defines each of the 36 data fields by category.

3.1 General Category

The General Category includes the following nine data fields:

- Equipment name.
- ID #.
- Decontamination process.
- Applications.
- Application notes.
- Availability.
- Current user.
- Manufacturer.
- Source.

Each of these data fields is defined in more detail in the remainder of this section.

3.1.1 Equipment Name

The Equipment Name data field is used to identify the name of the piece of equipment.

3.1.2 ID

The ID # data field is for identification purposes only.

3.1.3 Decontamination Process

The Decontamination Process identifies the process utilized by the decontamination equipment (i.e., thermal, chemical, or physical). The field also indicates if the process provides contaminant removal or detoxification.

3.1.4 Applications

The Applications data field identifies whether the equipment should be used for personnel, equipment, or infrastructure decontamination.

3.1.5 Application Notes

The Application Notes data field includes additional information to supplement the decontamination process, phase, and application field. If the equipment is used for personnel decontamination, an indication as to whether the equipment is for expedient or thorough decontamination will be indicated (if known). If the equipment is identified for personnel expedient decontamination, an indication as to whether it should be used for self/buddy, mass casualty, or hospital decontamination will also be indicated (if known).

3.1.6 Availability

Availability refers to how readily available the equipment is (e.g., how long it takes to receive equipment upon purchasing).

3.1.7 Current User

The Current User data field is used to identify organizations that are currently using the piece of equipment.

3.1.8 Manufacturer

The Manufacturer data field contains the name of the company that developed the piece of equipment and includes the address, telephone number, and point of contact (POC).

3.1.9 Source

The Source data field indicates where the equipment information was obtained. Potential sources include past market surveys and Internet web sites.

3.2 Operational Parameters Category

The Operational Parameters Category includes the following six data fields:

- Chemical warfare agents decontaminated/neutralized.
- Biological warfare agents decontaminated/neutralized.
- Toxic industrial material decontaminated/neutralized.
- Decontaminant.
- Capacity/throughput.
- Set-up time.

Each of these data fields is defined in more detail in the remainder of this section.

3.2.1 Chemical Warfare (CW) Agents Decontaminated/Neutralized

The Chemical Warfare (CW) Agents Decontaminated/Neutralized data field describes the ability of the equipment to decontaminate or neutralize chemical warfare (CW) agents. The most common types of classic CW agents are the nerve and blister agents. Nerve agents include GA (Tabun), GB (Sarin), GD (Soman), GF, and VX. Blister agents include H and HD (Sulfur Mustards), HN (Nitrogen Mustard), and L (Lewisite).

3.2.2 Biological Warfare (BW) Agents Decontaminated/Neutralized

The Biological Warfare (BW) Agents Decontaminated/Neutralized data field describes the ability of the equipment to decontaminate or neutralize BW agents. Examples of classical BW agent types include bacteria (Anthrax), viruses (Q Fever), rickettsia (Typhus), and toxins (Botulinum Toxin).

3.2.3 Toxic Industrial Materials (TIMs) Decontaminated/Neutralized

The Toxic Industrial Materials (TIMs) Decontaminated/Neutralized data field describes the ability of the equipment to decontaminate or neutralize non-CW/BW agents. TIMs are used in a variety of settings such as manufacturing facilities, maintenance areas, and storage areas. TIMs are further characterized by using a high, medium, or low hazard index. Examples of TIMs are ammonia, carbon monoxide, hydrogen cyanide, phosgene, and mineral acids (i.e., hydrochloric acid, sulfuric acid, nitric acid, etc.).

3.2.4 Decontaminant

The Decontaminant data field includes the recommended decontaminant (e.g., water, sodium hydroxide, and DS2) used by the piece of equipment.

3.2.5 Capacity/Throughput

Capacity/Throughput of a piece of equipment indicates the number of personnel, vehicles, equipment, and shelters that can be decontaminated per hour.

3.2.6 Set-up Time

Set-up Time is the time required to conduct decontamination operations. This includes time for setup, processing, and tear down.

3.3 Physical Parameters Category

Physical Parameters Category include the following three data fields:

- Size.
- Weight.
- Power requirements.

Each of these data fields is defined in more detail in the remainder of this section.

3.3.1 Size

The Size data field indicates the external dimensions of the equipment.

3.3.2 Weight

The Weight data field indicates the total weight of the equipment in operational status.

3.3.3 Power Requirements

The Power Requirements data field includes the type of power (ac, dc, etc.) required to operate the equipment.

3.4 Logistical Parameters Category

The Logistical Parameters Category includes the following 11 data fields:

- Consumables required.
- Maintenance required.
- Shelf life.
- Transportability.
- Durability.
- Environmental conditions.
- Environmental considerations.
- Resources.
- Unit cost.
- Maintenance cost.
- Warranty.

Each of these data fields is defined in more detail in the remainder of this section.

3.4.1 Consumables Required

The Consumables Required data field includes supplies that the equipment uses during operation and storage. Examples of consumables are batteries, filters, sensors, compressed gases, etc.

3.4.2 Maintenance Required

The Maintenance Required data field includes the services and parts that are necessary to keep the equipment at its peak operational readiness. This includes any parts needed during preventative maintenance.

3.4.3 Shelf Life

Shelf Life refers to the length of time a piece of equipment or decontaminant can be stored before it needs to be replaced or replenished.

3.4.4 Transportability

The Transportability data field refers to the ability of the equipment to be transported including any support equipment required to operate it.

3.4.5 Durability

Durability describes how rugged the equipment is, i.e., how well can the equipment withstand rough handling and still operate.

3.4.6 Environmental Conditions

The Environmental Conditions data field indicates the type of environment required for the equipment to operate optimally. For example, some equipment is designed to operate under common environmental conditions (e.g., rain, snow, fog, etc.). Other equipment may require more climate-controlled conditions.

3.4.7 Environmental Considerations

Environmental Considerations refers to the type of environmental issues that arise when using a piece of decontamination equipment (e.g., waste disposal).

3.4.8 Resources

The Resources data field refers to the types of resources required to operate a piece of decontamination equipment (e.g., manpower).

3.4.9 Unit Cost

The Unit Cost data field is the cost of the equipment, including the cost of all consumables and support equipment.

3.4.10 Maintenance Cost

The Maintenance Cost data field is the cost needed to maintain and operate the equipment, which is normally based on equipment usage rates.

3.4.11 Warranty

Warranty refers to the length of time a piece of equipment would be guaranteed by the manufacturer.

3.5 Special Requirements Category

The Special Requirements Category includes the following seven data fields:

- Operator skills required.
- Operator training required.
- Training available.
- Manuals available.
- Support equipment.
- Testing information.
- Applicable regulations.

Each of these data fields is defined in more detail in the remainder of this section.

3.5.1 Operator Skills Required

The Operator Skills Required data field refers to the level of education and training required for the individual to operate the equipment.

3.5.2 Operator Training Required

The Operator Training Required data field refers to the amount of instruction time the operator needs to become proficient in operating the equipment.

3.5.3 Training Available

The Training Available data field refers to training provided by the manufacturer.

3.5.4 Manuals Available

The Manuals Available data field indicates the types of manuals available from the manufacturer (e.g., user manuals, training documentation, etc.).

3.5.5 Support Equipment

The Support Equipment data field includes any additional equipment required to operate the primary unit.

3.5.6 Testing Information

The Testing Information data field includes data obtained from the manufacturer and other sources regarding the equipment (e.g., validation testing).

3.5.7 Applicable Regulations

The Applicable Regulations data field includes any Government and/or safety regulations that may apply to the possession, use, storage, or disposal of a piece of equipment.

APPENDIX A—REFERENCES

APPENDIX A—REFERENCES

1. John A. Barrett, William M. Jackson, Imran A. Baig, Amy L. Coverstone, Craig E. Harfield, Richard D. Arcilesi, James Butler, William Burton, and Charles W. Williams, Jr, *Wide Area Decontamination: CB Decontamination Technologies, Equipment and Projects, Final Report*, Chemical Warfare/Chemical Biological Defense Information Analysis Center, Edgewood, MD, March 1999.
2. Armando S. Bevelacqua and Richard H. Stilp, *Terrorism Handbook for Operational Responders*, Emergency Film Group, Edgartown, MA, January 1998.
3. Robert E. Hunt, Timothy Hayes, and Warren B. Carroll, *Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident*, Battelle, Columbus, OH, September 1999.
4. A.K. Stuempfle, D.J. Howells, S.J. Armour, and C.A. Boulet, *International Task Force 25: Hazard from Industrial Chemicals Final Report*, Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD, AD-B236562, ERDEC-SP-061, April 1998.
5. *Responding to A Biological or Chemical Threat: A Practical Guide*, U.S. Department of State, Bureau of Diplomatic Security, Washington, DC, 1996.
6. *2000 Emergency Response Guidebook, A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Materials Incident*, U.S. Department of Transportation, Research and Special Programs Administration, Tempest Publishing, Alexandria, VA, January 2000.

**APPENDIX B—INDEX BY DECONTAMINATION EQUIPMENT
IDENTIFICATION NUMBER**

Index by Decontamination Equipment Identification Number

<i>ID #</i>	<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>Page E-#</i>
1	Skin Decontaminant Lotion	Anachemia Canada Inc., Canada	1
2	K1-05 Standard Unit	Applied Surface Technologies, NJ	3
3	K4-05 High Purity	Applied Surface Technologies, NJ	5
4	Snow Motion	Applied Surface Technologies, NJ	7
5	Decontamination Glove Booths	Container Products Corporation, NC	9
6	HAL Series	Crest Ultrasonics, NJ	11
7	The Optimum Console	Crest Ultrasonics, NJ	13
8	Ice Gun	Cryogenesis, OH	15
9	Cryogenesis Booth	Cryogenesis, OH	17
10	Delta V-1 Dry Ice Surface Cleaning System	Cryokinetics, KS	19
11	NBC-DEWDECON-PERS Emergency Response Personnel Decontamination Kit	DEW Engineering and Development Ltd., Canada	21
12	NBC-DEWDECON-M Decontaminant Mixer/Applicator	DEW Engineering and Development Ltd., Canada	23
13	NBC-DEWDECON-2L	DEW Engineering and Development Ltd., Canada	25
14	NBC- DEWDECON-3L Decontamination Device	DEW Engineering and Development Ltd., Canada	27
15	NBC-DEWDECON-20L Decontamination Device	DEW Engineering and Development Ltd., Canada	29
16	M17 Lightweight Decontamination System, Sanator	Engineered Air Systems, Inc., MO	31
17	DECON Powder Glove	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	34
18	Personal Decontamination Kit	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	36
19	SDMS Sensitive Material Decontamination System	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	38
20	Thorough Decontamination System	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	40
21	Mobile Decon Pad	HazDecon, OH	42
22	Mobile Laboratories	HazDecon, OH	44
23	Portaflex CUPOLA Decontamination Shelter	Hughes Safety Showers USA, VA	46

<i>ID #</i>	<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>Page E-#</i>
24	Portaflex Decontamination Shower Series	Hughes Safety Showers USA, VA	48
25	Response and Decontamination Unit	Hughes Safety Showers USA, VA	51
26	Blast Guard	Irvin Aerospace Canada Ltd.	53
27	First Responder's Blast Guard	Irvin Aerospace Canada Ltd.	56
28	First Responder's Surface Decon Unit	Irvin Aerospace Canada Ltd.	58
29	CASCAD	Irvin Aerospace Canada Ltd.	60
30	COLPRO	Irvin Aerospace Canada Ltd.	62
31	Decon System for Sensitive Materials (DSSM)	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	64
32	Field Shower System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	66
33	Karcher Decojet-Trailer Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	68
34	Mediclean	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	70
35	Mobile Environmental Protection Container	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	72
36	Karcher DT60 Decontamination Tent	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	74
37	Karcher SCS 1200 DE Lightweight Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	76
38	Karcher HDS 1200 EK High-Pressure Steam Jet Cleaner Unit	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	78
39	Karcher Decont Jet 21	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	80
40	Karcher DECOCONTAIN 3000 Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	82

<i>ID #</i>	<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>Page E-#</i>
41	Karcher Decontamination Trailer	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	85
42	Karcher SCS 1800 DE Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	87
43	Karcher Decojet Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	89
44	Karcher DECOCONTAIN 1500 Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	91
45	Karcher Mobile Field Laundry CFL 60	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	94
46	Karcher C8-DADS Direct Application Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	96
47	Karcher Decont Tent	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	98
48	Karcher Portable Lightweight Decontamination System DS 10	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	100
49	Karcher Hot Air Generator FB 60 E	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	102
50	Karcher MPDS MultiPurpose Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	104
51	Karcher Hot Air Generator FB 20	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	106
52	Karcher AEDA1 Decontamination Equipment	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	108
53	Karcher M600 Decontaminant Mixer	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	110
54	Atmospheric Pressure Plasma Jet	Los Alamos National Laboratory, NM	112

<i>ID #</i>	<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>Page E-#</i>
55	Decon Hoop	MITI Manufacturing, Inc., CO	114
56	SNL Decon Formulation	Modec, Inc., CO	116
57	Reactive Skin Decontaminant Lotion (RSDL)	O'Dell Engineering Ltd., Canada	118
58	Plychem DECAS W Casualty Decontamination Unit	Plysu PLC, United Kingdom	120
59	PLYCHEM DPI Decontamination Unit	Plysu PLC, United Kingdom	122
60	Modular Mass Casualty Decontamination System	Reeves Manufacturing, Inc., MD	124
61	Decontamination Kit, Personal No. 1, Mark 1	Remploy Ltd., United Kingdom	126
62	Decontamination Kit, Personal No. 2, Mark 1	Richmond Packaging (UK) Ltd., United Kingdom	128
63	Hazmat Decon Shower	RMC Medical, Inc., PA	130
64	Hazmat Decon Backboard	RMC Medical, Inc., PA	132
65	Decontamination Apparatus, Portable, DS2, ABC-M11	Slate Enterprises, Inc., CA	134
66	M13 Portable Decontaminating Apparatus (DAP)	Slate Enterprises, Inc., CA	136
67	NBC6F Water Purification Unit (WPU)	Stella-Meta, United Kingdom	138
68	Decontamination Kit, No. 2	Tradeways Ltd., MD	140
69	Decontamination Kit, Individual Equipment: M295	Truetech, NY	142
70	TVI Quick-E WMD Decon Shower Shelter	TVI Corporation, MD	144
71	TVI Quik-Kleen Mass Decontamination System	TVI Corporation, MD	146
72	Zenon Advanced Double Pass Reverse Osmosis Water Purification Unit	Zenon Environmental Systems Inc., Canada	148

**APPENDIX C—INDEX BY DECONTAMINATION
EQUIPMENT NAME**

Index by Decontamination Equipment Name

<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>ID #</i>	<i>Page E-#</i>
Atmospheric Pressure Plasma Jet	Los Alamos National Laboratory, NM	54	112
Blast Guard	Irvin Aerospace Canada Ltd.	26	53
CASCAD	Irvin Aerospace Canada Ltd.	29	60
COLPRO	Irvin Aerospace Canada Ltd.	30	62
Cryogenesis Booth	Cryogenesis, OH	9	17
Decon Hoop	MITI Manufacturing, Inc., CO	55	114
DECON Powder Glove	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	17	34
Decon System for Sensitive Materials (DSSM)	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	31	64
Decontamination Apparatus, Portable, DS2, ABC-M11	Slate Enterprises, Inc., CA	65	134
Decontamination Glove Booths	Container Products Corporation, NC	5	9
Decontamination Kit, No. 2	Tradeways Ltd., MD	68	140
Decontamination Kit, Individual Equipment: M295	Truetech, NY	69	142
Decontamination Kit, Personal No. 1, Mark 1	Remploy Ltd., United Kingdom	61	126
Decontamination Kit, Personal No. 2, Mark 1	Richmond Packaging (UK) Ltd., United Kingdom	62	128
Delta V-1 Dry Ice Surface Cleaning System	Cryokinetics, KS	10	19
Field Shower System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	32	66
First Responder's Blast Guard	Irvin Aerospace Canada Ltd.	27	56
First Responder's Surface Decon Unit	Irvin Aerospace Canada Ltd.	28	58
HAL Series	Crest Ultrasonics, NJ	6	11
Hazmat Decon Backboard	RMC Medical, Inc., PA	64	132
Hazmat Decon Shower	RMC Medical, Inc., PA	63	130
Ice Gun	Cryogenesis, OH	8	15
K1-05 Standard Unit	Applied Surface Technologies, NJ	2	3
K4-05 High Purity	Applied Surface Technologies, NJ	3	5

<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>ID #</i>	<i>Page E-#</i>
Karcher AEDA1 Decontamination Equipment	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	52	108
Karcher C8-DADS Direct Application Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	46	96
Karcher DECOCONTAIN 1500 Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	44	91
Karcher DECOCONTAIN 3000 Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	40	82
Karcher Decojet Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	43	89
Karcher Decojet-Trailer Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	33	68
Karcher Decont Jet 21	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	39	80
Karcher Decont Tent	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	47	98
Karcher Decontamination Trailer	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	41	85
Karcher DT60 Decontamination Tent	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	36	74
Karcher HDS 1200 EK High-Pressure Steam Jet Cleaner Unit	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	38	78
Karcher Hot Air Generator FB 60 E	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	49	102
Karcher Hot Air Generator FB 20	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	51	106

<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>ID #</i>	<i>Page E-#</i>
Karcher M600 Decontaminant Mixer	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	53	110
Karcher Mobile Field Laundry CFL 60	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	45	94
Karcher MPDS MultiPurpose Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	50	104
Karcher Portable Lightweight Decontamination System DS 10	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	48	100
Karcher SCS 1200 DE Lightweight Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	37	76
Karcher SCS 1800 DE Decontamination System	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	42	87
M13 Portable Decontaminating Apparatus (DAP)	Slate Enterprises, Inc., CA	66	136
M17 Lightweight Decontamination System, Sanator	Engineered Air Systems, Inc., MO	16	31
Mediclean	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	34	70
Mobile Decon Pad	HazDecon, OH	21	42
Mobile Environmental Protection Container	Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	35	72
Mobile Laboratories	HazDecon, OH	22	44
Modular Mass Casualty Decontamination System	Reeves Manufacturing, Inc., MD	60	124
NBC- DEWDECON-3L Decontamination Device	DEW Engineering and Development Ltd., Canada	14	27
NBC6F Water Purification Unit (WPU)	Stella-Meta, United Kingdom	67	138
NBC-DEWDECON-20L Decontamination Device	DEW Engineering and Development Ltd., Canada	15	29

<i>Decontamination Equipment Name</i>	<i>Manufacturer</i>	<i>ID #</i>	<i>Page E-#</i>
NBC-DEWDECON-2L	DEW Engineering and Development Ltd., Canada	13	25
NBC-DEWDECON-M Decontaminant Mixer/ Applicator	DEW Engineering and Development Ltd., Canada	12	23
NBC-DEWDECON-PERS Emergency Response Personnel Decontamination Kit	DEW Engineering and Development Ltd., Canada	11	21
Personal Decontamination Kit	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	18	36
Plychem DECAS W Casualty Decontamination Unit	Plysu PLC, United Kingdom	58	120
PLYCHEM DPI Decontamination Unit	Plysu PLC, United Kingdom	59	122
Portaflex CUPOLA Decontamination Shelter	Hughes Safety Showers USA, VA	23	46
Portaflex Decontamination Shower Series	Hughes Safety Showers USA, VA	24	48
Reactive Skin Decontaminant Lotion (RSDL)	O'Dell Engineering Ltd., Canada	57	118
Response and Decontamination Unit	Hughes Safety Showers USA, VA	25	51
SDMS Sensitive Material Decontamination System	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	19	38
Skin Decontaminant Lotion	Anachemia Canada Inc., Canada	1	1
SNL Decon Formulation	Modec, Inc., CO	56	116
Snow Motion	Applied Surface Technologies, NJ	4	7
The Optimum Console	Crest Ultrasonics, NJ	7	13
Thorough Decontamination System	GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	20	40
TVI Quick-E WMD Decon Shower Shelter	TVI Corporation, MD	70	144
TVI Quik-Kleen Mass Decontamination System	TVI Corporation, MD	71	146
Zenon Advanced Double Pass Reverse Osmosis Water Purification Unit	Zenon Environmental Systems Inc., Canada	72	148

**APPENDIX D—INDEX BY DECONTAMINATION EQUIPMENT
MANUFACTURER**

Index by Decontamination Equipment Manufacturer

<i>Manufacturer</i>	<i>Equipment Name</i>	<i>ID #</i>	<i>Page E-#</i>
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Decon System for Sensitive Materials (DSSM)	31	64
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Field Shower System	32	66
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Decojet-Trailer Decontamination System	33	68
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Mediclean	34	70
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Mobile Environmental Protection Container	35	72
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher DT60 Decontamination Tent	36	74
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher SCS 1200 DE Lightweight Decontamination System	37	76
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher HDS 1200 EK High-Pressure Steam Jet Cleaner Unit	38	78
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Decont Jet 21	39	80
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher DECOCONTAIN 3000 Decontamination System	40	82
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Decontamination Trailer	41	85
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher SCS 1800 DE Decontamination System	42	87
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Decojet Decontamination System	43	89

<i>Manufacturer</i>	<i>Equipment Name</i>	<i>ID #</i>	<i>Page E-#</i>
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher DECOCONTAIN 1500 Decontamination System	44	91
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Mobile Field Laundry CFL 60	45	94
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher C8-DADS Direct Application Decontamination System	46	96
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Decont Tent	47	98
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Portable Lightweight Decontamination System DS 10	48	100
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Hot Air Generator FB 60 E	49	102
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher MPDS MultiPurpose Decontamination System	50	104
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher Hot Air Generator FB 20	51	106
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher AEDA1 Decontamination Equipment	52	108
Alfred Karcher Gmbh & Company, Germany U.S. Agent: Life Safety Systems	Karcher M600 Decontaminant Mixer	53	110
Anachemia Canada Inc., Canada	Skin Decontaminant Lotion	1	1
Applied Surface Technologies, NJ	K1-05 Standard Unit	2	3
Applied Surface Technologies, NJ	K4-05 High Purity	3	5
Applied Surface Technologies, NJ	Snow Motion	4	7
Container Products Corporation, NC	Decontamination Glove Booths	5	9
Crest Ultrasonics, NJ	HAL Series	6	11
Crest Ultrasonics, NJ	The Optimum Console	7	13
Cryogenesis, OH	Ice Gun	8	15
Cryogenesis, OH	Cryogenesis Booth	9	17

<i>Manufacturer</i>	<i>Equipment Name</i>	<i>ID #</i>	<i>Page E-#</i>
Cryokinetics, KS	Delta V-1 Dry Ice Surface Cleaning System	10	19
DEW Engineering and Development Ltd., Canada	NBC-DEWDECON-PERS Emergency Response Personnel Decontamination Kit	11	21
DEW Engineering and Development Ltd., Canada	NBC-DEWDECON-M Decontaminant Mixer/ Applicator	12	23
DEW Engineering and Development Ltd., Canada	NBC-DEWDECON-2L	13	25
DEW Engineering and Development Ltd., Canada	NBC- DEWDECON-3L Decontamination Device	14	27
DEW Engineering and Development Ltd., Canada	NBC-DEWDECON-20L Decontamination Device	15	29
Engineered Air Systems, Inc., MO	M17 Lightweight Decontamination System, Sanator	16	31
GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	DECON Powder Glove	17	34
GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	Personal Decontamination Kit	18	36
GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	SDMS Sensitive Material Decontamination System	19	38
GIAT Industries, France U.S. Agent: CENTECH GROUP, Inc.	Thorough Decontamination System	20	40
HazDecon, OH	Mobile Decon Pad	21	42
HazDecon, OH	Mobile Laboratories	22	44
Hughes Safety Showers USA, VA	Portaflex CUPOLA Decontamination Shelter	23	46
Hughes Safety Showers USA, VA	Portaflex Decontamination Shower Series	24	48
Hughes Safety Showers USA, VA	Response and Decontamination Unit	25	51
Irvin Aerospace Canada Ltd.	Blast Guard	26	53
Irvin Aerospace Canada Ltd.	First Responder's Blast Guard	27	56
Irvin Aerospace Canada Ltd.	First Responder's Surface Decon Unit	28	58
Irvin Aerospace Canada Ltd.	CASCAD	29	60
Irvin Aerospace Canada Ltd.	COLPRO	30	62
Los Alamos National Laboratory, NM	Atmospheric Pressure Plasma Jet	54	112

<i>Manufacturer</i>	<i>Equipment Name</i>	<i>ID #</i>	<i>Page E-#</i>
MITI Manufacturing, Inc., CO	Decon Hoop	55	114
Modec, Inc., CO	SNL Decon Formulation	56	116
O'Dell Engineering Ltd., Canada	Reactive Skin Decontaminant Lotion (RSDL)	57	118
Plysu PLC, United Kingdom	Plychem DECAS W Casualty Decontamination Unit	58	120
Plysu PLC, United Kingdom	PLYCHEM DPI Decontamination Unit	59	122
Reeves Manufacturing, Inc., MD	Modular Mass Casualty Decontamination System	60	124
Remploy Ltd., United Kingdom	Decontamination Kit, Personal No. 1, Mark 1	61	126
Richmond Packaging (UK) Ltd., United Kingdom	Decontamination Kit, Personal No. 2, Mark 1	62	128
RMC Medical, Inc., PA	Hazmat Decon Shower	63	130
RMC Medical, Inc., PA	Hazmat Decon Backboard	64	132
Slate Enterprises, Inc., CA	Decontamination Apparatus, Portable, DS2, ABC-M11	65	134
Slate Enterprises, Inc., CA	M13 Portable Decontaminating Apparatus (DAP)	66	136
Stella-Meta, United Kingdom	NBC6F Water Purification Unit (WPU)	67	138
Tradeways Ltd., MD	Decontamination Kit, No. 2	68	140
Truetech, NY	Decontamination Kit, Individual Equipment: M295	69	142
TVI Corporation, MD	TVI Quick-E WMD Decon Shower Shelter	70	144
TVI Corporation, MD	TVI Quik-Kleen Mass Decontamination System	71	146
Zenon Environmental Systems Inc., Canada	Zenon Advanced Double Pass Reverse Osmosis Water Purification Unit	72	148