

# **Museum Collections Management Handbook**

## **Volume II: Practices and Procedures**

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Museum Services Section  
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# Table of Contents

Preface .....	iii
Acknowledgments .....	v
Table of Contents.....	vii
List of Figures.....	xi
 <b>Chapter 1: Introduction</b>	
Mission Statements.....	1.1
Roles and Responsibilities.....	1.3
How to Use This Manual.....	1.17
 <b>Chapter 2: The Work Environment</b>	
Basic Health and Safety Practices .....	2.1
Contaminated Collections.....	2.8
Types of Hazardous Materials .....	2.11
Protective Clothing and Equipment.....	2.32
Material Safety Data Sheets (MSDS).....	2.35
Back Safety.....	2.46
 <b>Chapter 3: Collection Development</b>	
The Statewide Collection.....	3.1
Scope of Collections Statement (SOCS) .....	3.7
Acquisition of Objects – Criteria.....	3.15
Gifts .....	3.17
Bequests.....	3.35
Purchases with State Funds .....	3.37
Property Surveys (Transfers from Other State Agencies) .....	3.45
Objects and Specimens Found On-Site .....	3.51
Resolution of Old or Abandoned Loans .....	3.61
Acquisition Checklist.....	3.63

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**Chapter 4: Acquisitions with Special Considerations**

Natural History Specimens and Permits .....	4.1
Historic Firearms .....	4.5
Archaeology Collections .....	4.11
Paleontology Collections .....	4.15
Repatriation and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).....	4.19

**Chapter 5: Registration**

The Registration System.....	5.1
The Electronic Registration System .....	5.3
Basic Steps in the Registration Process .....	5.7
Numbering Documents .....	5.11
The Accession Book .....	5.19
Setting Up the Filing System.....	5.29
Registration Checklist.....	5.53

**Chapter 6: Collection Activities**

Introduction.....	6.1
General Requirements for Activity Documents.....	6.3
<i>DPR 932, Collection Manager's Transmittal</i> .....	6.7
Incoming Loans .....	6.13
<i>DPR 927, Receipt of Objects – Incoming</i> .....	6.25
Outgoing Loans .....	6.35
<i>DPR 929, Release of Objects – Outgoing</i> .....	6.47
Park to Park Transfers .....	6.57
Authorizations for Extended Hands-On Use .....	6.67
Deaccessions.....	6.75

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**Chapter 7: Cataloging**

Cataloging General Collections .....	7.1
Levels of Cataloging.....	7.5
Assigning Catalog (Object) Numbers.....	7.7
Manual and Electronic Cataloging .....	7.13
Marking Catalog Numbers on Objects .....	7.27
Cataloging Checklist.....	7.47

**Chapter 8: Condition Reports, Appraisals, & Inventories**

Condition Reports.....	8.1
Appraisals .....	8.15
Inventories .....	8.25
Inventory Checklist.....	8.43
<b>Index.....</b>	<b>9.1</b>



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## List of Figures

### Chapter 1: Introduction

Figure 1	Sample Letter for Delegating Collection Management.....	1.13
Figure 2	Sample Letter for Designating Museum Collection Managers .....	1.13
Figure 3	Sample Letter Designating Staff to Accept and Release Objects.....	1.13

### Chapter 2: The Work Environment

Figure 4	Lyme Disease Fact Sheet .....	2.17
Figure 5	Hantavirus Public Health Fact Sheet.....	2.21
Figure 6	Valley Fever Facts.....	2.25
Figure 7	Histoplasmosis Fact Sheet.....	2.28
Figure 8	Material Data Safety Sheet (MSDS) .....	2.36

### Chapter 3: Collection Development

Figure 9	<i>DPR 925, Deed of Gift</i> .....	3.27
Figure 10	<i>DPR 925, Deed of Gift</i> .....	3.27
Figure 11	<i>DPR 40, Subpurchase Order</i> .....	3.39
Figure 12	<i>DPR 439, Petty Cash Voucher</i> .....	3.39
Figure 13	Cal Card Purchase .....	3.39
Figure 14	<i>STD 158, Property Transfer Report</i> .....	3.47
Figure 15	<i>DPR 931, Objects and Specimens Found On-Site</i> .....	3.53
Figure 16	<i>DPR 931, Objects and Specimens Found On-Site</i> .....	3.57

### Chapter 5: Registration

Figure 17	Accession Book Pages.....	5.21
Figure 18	Accession File Folder Labels .....	5.30
Figure 19	Accession Number Log .....	5.33
Figure 20	Activity Number Log .....	5.33
Figure 21	"Z" Number Log .....	5.33
Figure 22	Source Card .....	5.42

Figure 23	Park Location Chart.....	5.45
Figure 24	Out Card.....	5.50
Figure 25	Out Card.....	5.51

## Chapter 6: Collection Activities

Figure 26	<i>DPR 932, Collection Manager's Transmittal</i> .....	6.9
Figure 27	<i>DPR 926, Loan Agreement – Incoming</i> .....	6.17
Figure 28	Number Log for Tracking Incoming Loans .....	6.22
Figure 29	<i>DPR 927, Receipt of Objects – Incoming</i> (objects owned by others; no previous agreement).....	6.27
Figure 30	<i>DPR 927, Receipt of Objects – Incoming</i> (objects owned by others; authorized agreement in place).....	6.27
Figure 31	<i>DPR 927, Receipt of Objects – Incoming</i> (DPR-owned objects returned to the Department).....	6.27
Figure 32	<i>DPR 928, Loan Agreement – Outgoing</i> .....	6.41
Figure 33	<i>DPR 929 – Release of Objects –Outgoing</i> (DPR-owned objects released to others).....	6.49
Figure 34	<i>DPR 929, Release of Objects – Outgoing</i> (objects held in temporary custody by DPR are returned to owners) .....	6.49
Figure 35	<i>DPR 930, Park to Park Transfer</i> (for the <u>permanent</u> transfer of objects from one park unit to another).....	6.61
Figure 36	<i>DPR 930, Park to Park Transfer</i> (for the <u>temporary</u> transfer of objects to another park unit) .....	6.61
Figure 37	<i>DPR 934, Authorization for Extended Hands-On Use</i> .....	6.71
Figure 38	Deaccession Proposal Worksheet.....	6.81
Figure 39	Deaccession Procedure Checklist.....	6.83

## Chapter 7: Cataloging

Figure 40	<i>DPR 444A, Catalog Card Worksheet</i> .....	7.16
Figure 41	<i>DPR 444B, Catalog Card</i> (Minimal Level) .....	7.16
Figure 42	<i>DPR 444B, Catalog Card</i> (Basic Level).....	7.16
Figure 43	<i>DPR 444B, Catalog Card</i> (Full Level).....	7.16

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## **Chapter 8: Condition Reports, Appraisals & Inventories**

Figure 44	Sample Condition Report-Free Text Format .....	8.3
Figure 45	Sample Condition Report-Checklist Format .....	8.5
Figure 46	Sample Condition Report-Natural History Specimens.....	8.7
Figure 47	Sample Condition Report-Object on Loan.....	8.9
Figure 48	Elements of a Correctly Prepared Appraisal .....	8.21
Figure 49	<i>DPR 933, Collection Inventory</i> .....	8.35
Figure 50	<i>DPR 999, Museum Collections Loss or Damage Report</i> .....	8.39



# THE WORK ENVIRONMENT

Chapter 2 is on health and safety practices that pertain to museum staff in State Parks. It is not possible to anticipate every danger or cover every topic comprehensively. This chapter emphasizes the hazards that DPR employees are most likely to encounter when working with museum collections.

<b>Basic Health and Safety Practices</b> .....	2.1
Introduction.....	2.1
The Physical Space .....	2.1
Safety Practices .....	2.2
When Handling Objects .....	2.2
When Moving Objects .....	2.5
Health and Safety Training .....	2.6
Further Information.....	2.7
<b>Contaminated Collections</b>	
Introduction.....	2.8
Practices Museums Should Follow .....	2.8
Further Information.....	2.10
<b>Types of Hazardous Materials</b> .....	2.11
Introduction.....	2.11
Flammables and Explosives.....	2.11
Asbestos .....	2.12
Radioactive Materials.....	2.12
Poisons .....	2.13
Biological Hazards (Pathogens).....	2.14
Biological Hazards (Fauna).....	2.16
Lyme Disease Facts (Figure 4) .....	2.17
Hantavirus Public Health Fact Sheet (Figure 5) .....	2.21
Valley Fever Facts (Figure 6) .....	2.25

## CHAPTER 2

---

Histoplasmosis Facts (Figure 7).....	2.28
<b>Protective Clothing and Equipment.....</b>	<b>2.32</b>
Introduction.....	2.32
Clothing.....	2.32
Smocks, Coveralls and Lab Coats.....	2.32
Gloves .....	2.32
Equipment.....	2.34
Respirators.....	2.34
Eye Protection.....	2.34
<b>Material Safety Data Sheets (MSDS) .....</b>	<b>2.35</b>
MSDS Forms.....	2.35
Sample Material Data Safety Sheet (MSDS) (Figure 8).....	2.36
<b>Back Safety .....</b>	<b>2.46</b>
Introduction.....	2.46
Planning Ahead.....	2.46
Proper Body Mechanics for Lifting and Carrying.....	2.47
Proper Body Mechanics for Reaching .....	2.47
Two-person Lifting and Carrying .....	2.48

# Basic Health and Safety Practices

## Introduction

This chapter describes the conditions and practices necessary for a safe and healthy museum work environment. If staff members are aware of potentially harmful materials and behaviors, and if they follow proper procedures and exercise common sense, most hazards can be avoided or mitigated.

In State Parks, museum personnel work in widely varying conditions from modern, climate-controlled offices to dusty, drafty old barns. Good health and safety measures should be practiced wherever museum staff is working. A safe and healthy work site for employees translates to safer and healthier conditions for the collections with which they work.

## The Physical Space

The following factors should be taken into account when planning the physical area where curatorial work is to take place.

- Is the space well lit?
- Are the areas where staff works with objects away from direct sunlight?
- Is there adequate ventilation, free from drafts or excessive heat?
- Are the air conditioning filters changed on a regular basis?
- Is the storage and shelving suitable for the types of objects you are required to house?
- Are shelving and storage cabinets secured, so they are not a hazard?
- Is the building and equipment kept in good repair? For example: the tables upon which you place objects should be sturdy and stable.

- Is the space arranged to minimize the handling and movement of objects? Ideally, the areas for receiving, unpacking, examining, registering, photographing, storing, packing, and shipping objects are in close proximity to each other.
- Are there raised tables available that will allow staff to process collections without back strain?
- Are there fire extinguishers in the area of the appropriate type and number? Do employees know how to use them?
- Are all hazardous substances clearly labeled, sealed, and properly stored?
- Is a first aid box accessible? Is it up-to-date and is there at least one staff member with first aid training?
- Is there an emergency plan? Are there emergency contacts posted? Do employees know where to find various shut-off valves (i.e., gas, water, etc.)?

## Safety Practices

Avoiding harm is infinitely better than recovering from it. The following is a list of basic safety practices to follow when you are working with museum objects. The list is divided into two parts: safety practices when you are handling objects and safety practices when you are moving objects.

### When Handling Objects

- Never handle an object until you know it's safe to do so. If you think an object presents a health risk, wait until you can obtain appropriate safety equipment and/or handling advice before touching or moving it.
- If you do not have information on any treatments applied to ethnographic artifacts, assume that hazardous pesticides may be present. Wear nitrile gloves (not cotton or latex) while handling potentially contaminated artifacts (see the section on Contaminated Collections which follows).
- Preplan all tasks.

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- Good housekeeping is important. Keep work areas clean and free of dust, dirt, litter, and clutter.
  - Ensure that work surfaces are well cleaned after they have been in contact with artifacts that may have been exposed to toxins. Sponge clean or wet-mop floors with soap and water.
  - Do not smoke, eat, or drink while working with museum objects.
  - Know the nature of the materials (including packing materials) that you are working with.
  - While the area in which you are working should be well ventilated, care should be taken to prevent drafts and air currents that will raise particulates. Such care is especially important when handling objects that are friable (crumble easily), are dusty, or have pollens, charcoal, chalk, or loose pigments on them, or have biological or chemical hazards associated with them. If possible, work with contaminated objects outside of the storage area.
  - While in work and storage areas, do not carry or wear anything that may catch on things and cause damage to you or them. For example: purses, parcels, briefcases, coats, umbrellas, laptops, backpacks, jewelry, buttons, badges, even unsafe hairstyles. Cellular phones should be worn on belts. (Most State Park units should have lockers, offices, or other secured storage areas where such items may be placed.)
  - Wearing a lab coat also serves to protect your clothing from dust and artifacts from exposure to badges and buttons. Lab coats should be removed when you are out of the work area or after you have finished handling contaminated material. They should also be disposable and discarded at the end of each day, or kept clean to avoid transferring dust and dirt. Non-disposable coats should be laundered separately from other clothing.
  - If there is any chance dust has gotten onto your clothing, remove your clothes as soon as you get home, bag and launder separately from other items.
  - Do not handle objects unnecessarily.
  - Wear gloves that are appropriate for the materials with which you are working. When removing gloves, take care that your hands do not touch the exterior surface of the gloves. (For information on types of

gloves, see Gloves, under Protective Clothing and Equipment, this chapter, page 2.32-2.33.)

- Always wash your hands before and after handling or treating an object.
- In some circumstances, you may need to wear a dust mask or respirator to protect yourself against dust, biohazards, and/or allergens. If you wear a mask or respirator, you may need to have medical certification from a doctor. You also may need to have an up-to-date fit test for your device, as one size does not fit all. Assess your working situation, and choose an appropriate type of respirator and cartridges. High Efficiency Particulate Air (HEPA) filters are recommended for working with contaminated objects (for additional information, see Respirators in this chapter, page 2.34).
- Never assume a firearm is unloaded. To make sure a gun is safe to handle have a staff member with a peace officer classification check it out. If no one on your staff is familiar with this type of weapon, you can also go to a local gun shop or request assistance from a local sheriff or police department. For further information on the laws and regulations affecting the acquisition and storage of historic guns and ammunition, see Chapter 4, Historic Firearms, pages 4.5–4.10.
- Use all precautions when handling flammable, toxic, or sharp objects. (For further information, see Types of Hazardous Materials, this chapter, pages 2.11–2.31.)
- Exercise extreme caution if you have old medicine or chemical bottles or containers in your collection. The active ingredients of many of these materials can become even more potent over time. (For further information, see Types of Hazardous Materials, this chapter, pages 2.13–2.14.)
- Natural history specimens, Native American basketry, and other organic artifacts should be handled with care, as they may have been treated with arsenic or other biocides. If you do not have any information on the treatments applied to such artifacts, you should assume that hazardous pesticides are present. It is advisable to use nitrile gloves and a mask and to handle such artifacts as little as possible. See the section on Contaminated Collections in this chapter for more information.

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### When Moving Objects

- Eliminate unnecessary movement of objects. Know exactly where an object is to be placed before moving it. Reducing the number of motions reduces the risk of damage.
- If you are moving an object to another building, coordinate the move with all staff members involved. Make sure the receiving area is prepared before the move begins.
- Be aware of the space and the conditions around you. Danger is increased by low ceilings, narrow doorways, changes in floor surfaces, as well as by the presence of dust, light levels, extremes in temperature, or relative humidity.
- Examine the structural composition of the objects you are moving and their weak and strong elements. Handles, rims, and spouts are usually the weakest point on any object.
- Always use a cart or both hands when carrying an object.
- Avoid haste when handling or moving museum objects.
- Do not hand objects from one person to another. Instead place the object on a table and then have the other person pick it up.
- Never carry more than one object in your hands.
- Avoid conversation when moving objects.
- Use a box when carrying several lightweight objects. Separate each piece within the box. Never overcrowd a box or put heavy objects on top of light objects.
- The danger in moving any object is increased by unusual size or shape and heavy weight. Each large, awkward, or heavy object should be treated as a special problem. Two or more people should help in moving this type of object. Know the correct method of lifting in order to avoid back injuries. Consider using a dolly or hand truck.
- When using dollies or carts to transport objects:
  - Do not overload the shelves or let objects protrude from the sides.

- Do not place objects of different weights and sizes together.
  - Avoid letting an object protrude beyond a carrying box or hand truck.
  - Check door sizes, elevator sizes, and ceiling heights before moving large objects.
  - Anticipate raised doorsills or curbs.
  - Watch out for door and cabinet handles, desk and shelving corners.
  - Use two people to maneuver a cart between buildings.
  - Drive slowly and carefully; avoid quick stops.
- 
- Do not carry a painting by the top of its frame or stretcher. Place one hand beneath the painting and one hand at the side of the painting. If a painting is large, use more than one person to move it.
  - Remove or secure all loose pieces before moving pieces of furniture. Mirrors, marble tops, and unlocked drawers and doors should be removed or secured with straps.
  - Do not push furniture across a floor.
  - Never push anything across a rug.
  - Do not lift objects up and over other objects.
  - If possible, establish a “receiving area” where museum and archival materials are regularly delivered before they are moved to an exhibit, storage, or work area.

## **Health and Safety Training**

Everyone, including volunteers, should be trained in health and safety practices when they begin to work with museum collections. Periodic safety training is important even for experienced personnel. Refresher sessions should be given prior to the start of a large project to be aware of the most likely hazards involved in the project and to review safety precautions.

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## **Further Information**

If you have questions about any of the topics discussed in this chapter or need further information, contact Museum Services Section.

# Contaminated Collections

## Introduction

Collectors of objects have, since early in human history, attempted to prevent rodents and insects from devouring their collections. Through trial and error, a number of substances proved to be highly effective. Unfortunately, some of these elements – such as arsenic and mercury – were also lethal. The same components that had the ability to protect were also highly poisonous. The people who treated the collections with the intent of protection also succeeded in changing the objects into toxic health hazards.

Among the many organic objects treated by collectors and keepers were thousands of Indian artifacts. Sadly, since these treatments were considered standard preservation precautions, names and doses of the substances were rarely recorded. Until recently, the removal of these substances was thought to be impossible. Newly developed methods for removing and destroying the organic pesticides on objects can reduce the concentration of arsenic and mercury, but they cannot, as yet, be completely removed or neutralized. This has presented a health hazard for museum workers as well as for tribal members working with repatriated objects. It is required by law that museum staff inform recipients of repatriations of any known chemical treatment that presents a potential hazard to the objects or to the persons handling the objects. Collections subject to the Native American Graves Protection and Repatriation Act should be handled with appropriate precautions.

## Practices Museums Should Follow

- Identify Substances and Problem Pieces
  - All ethnographic artifacts collected and/or prepared before the mid-1950s should be considered potentially dangerous.
  - Inspect artifacts carefully.
  - Look for powdery or crystalline deposits or bloom, stains, tide lines, crystalline bloom.

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- Look for labels or tags in or on storage containers which may identify contaminated objects.
  - Study the documentation for clues; note that treatments were rarely recorded as they were considered part of routine collections management practices.
  - Inspect and/or test pre-1950s artifacts every several years as toxins may migrate from the interior.
  - If you discover traces of toxins: tag the contaminated objects indicating the contamination, isolate it (wrap it and/or move it), thoroughly annotate the object's documentation.
  - Develop a Toxins Inventory
    - The purpose of a toxins inventory is to identify the types of chemicals that objects have been, or may have been, exposed to. To collect information about toxins used on particular objects, you will need to review published reports, internal documents, archival records, and institutional memory. Consult with colleagues to determine prior practices and/or standards in the museum field and to establish a timeframe for the use of each substance as closely as possible; this may be useful in narrowing down which items may have been treated. Consider the inventory a living document and revisit it periodically to refine and update the information.
  - Conduct staff and volunteer training periodically.
  - Label cabinets or other storage containers suspected of or known to contain contaminated artifacts.
  - Obtain Material Safety Data Sheets on arsenic and other commonly-used chemicals and post in the workplace.
  - Provide and use proper protective clothing and equipment.
  - Stay informed about new developments and seek to inform others.
  - Post safety guidelines for handling contaminated objects throughout the workplace.
  - Exhibit contaminated objects only in enclosed spaces.
  - Never use objects exposed to chemicals in hands-on presentations.
-

- Make sure information is provided to lenders and others who may need to handle objects (staff, volunteers, visiting scholars or tribal members).

### **Further Information**

Examples of tools for staff training, sample Toxin Inventories, and other resources can be obtained from the Museum Services Section.

# Types of Hazardous Materials

## Introduction

Most hazardous materials in a museum environment fall into the categories listed below. Under each heading are examples of museum objects, followed by recommendations for handling the objects and locating expert assistance. Keep in mind that contaminants can be in packing materials or in/on the objects themselves.

## Flammables and Explosives

- Loaded firearms.
- Boxes of ammunition (The older the ammunition is, the more sensitive.)
- Fireworks
- Boxes of matches
- Powder flasks
- Historic fire extinguishers
- Mining explosives (e.g., blasting caps, black powder, dynamite, fuses, etc.)
- Cellulose nitrate negatives (celluloid), especially reels of film stored in metal cans
- Cellulose nitrate artifacts that look like ivory or tortoise shell

**Recommended Action:** If you come across live ammunition, booby traps, grenades or other explosive weapons or devices, contact a peace officer or the sheriff or police department regarding disposal and/or deactivation. Be aware that such items from archeological sites may be unrecognizable.

Cellulose nitrate negatives and film will become sticky to the touch and emit a distinctive odor before they reach the combustible stage. They should be stored at a low temperature and separate from other collections. The negatives should be separated from each other in appropriate sleeves. For further information about the care and storage of cellulose nitrate negatives and film, as well as other objects composed of celluloid, contact Museum Services Section.

## Asbestos

- Minerals (crocidite, tremolite).
- Papier-maché artifacts.
- Stuffing from taxidermy specimens.
- Textiles treated with flame-proofing.
- Old safes where asbestos has been used in liners for fireproofing.
- Old heating elements (e.g., old heater burner pads).
- Old lead wire where asbestos has been used for wrapping the wire.

**Recommended Action:** There is no safe level of exposure to asbestos. Many collections include the most harmful form of asbestos – tiny fibers that can be inhaled. Contact the Environmental Protection Agency (EPA) to obtain the names of licensed contractors who specialize in asbestos detection and removal.

## Radioactive Materials

- Mineral samples and some fossils that contain naturally occurring radioactive elements such as uranium or thorium.
- Radon gas from decaying minerals in geology collections.
- Some glassware, such as green depression glassware and vaseline glass, contain radioactive materials.
- Watch and instrument dials painted with radium.

**Recommended Action:** The above list is a sampling of specimens and artifacts that are known to be radioactive or contain radioactive material in them. The precautions for handling such materials are the same as for other potentially hazardous objects in a museum collection: Limit handling to the shortest duration. Wear gloves and a lab coat; hands should be washed after handling. It is important to avoid ingesting and inhaling dust from specimens or artifacts that may have radioactive materials in them. No food or beverages should be consumed in the work area. If work procedures generate dust, respiratory protection is recommended (for more information, see Respirators in this chapter, page 2.34).

One difficulty is knowing whether items in your collection present a health hazard to staff or visitors from exposure to radioactivity. If you have one or more items in your collection that you are concerned about, then you should have them assessed. There are local contractors who can assess your collection and advise you on proper storage or disposal measures. You can also contact the State Department of Health Services, Radiologic Health Branch (RHB) in Sacramento at (916) 327-5106. That office can advise you on the location of the nearest regional RHB office that can send someone out to determine if the item(s) is radioactive and if it's a health and safety concern. With regard to radon and radon monitoring, you should contact the Environmental Protection Agency (EPA).

Some curatorial personnel may choose to purchase a Geiger counter and periodically monitor storage areas and collections themselves. However, the disposal of radioactive materials is subject to complex regulations. Consequently, it is advisable to obtain expert help.

For additional information concerning State Parks and Recreation policies and procedures regarding radioactive materials, testing, and handling, refer to Section 11 of the Department's Hazard Guide on Radioactive Materials. The Hazard Guide can be accessed electronically on the Headquarters computer in the "N" (share) drive. The file, titled "HazGuide2004" can be found in Field Services; TechSrvFSD; Hazardous Materials.

## Poisons

- Taxidermy collections and their mounts.
- Some ethnographic collections.
- Some metal artifacts.
- Some textiles.
- Painted canvases.

- Picture frames.
- Basketry.
- Old medical/surgical equipment.
- Old pharmacy collections.
- Old chemistry sets.
- Mercury flasks.
- Cyanide drums.
- Herbarium collections.

**Recommended Action:** Arsenic, mercury compounds, and other chemicals were once commonly used to preserve some ethnographic artifacts and taxidermy specimens. Refer to the Contaminated Collections section in this chapter for tips on how to identify contaminated objects and how to handle them. Cyanide residues from old plating and cleaning procedures can be found on some copper, silver, and gold artifacts. Lead can be found in paints, gesso, plasters, and putty. Contact a conservator or Museum Services Section for help.

If you encounter medical, pharmacy, and chemical collections and the bottles or containers are clearly labeled, you may be able to contact a local pharmacist who can tell you if these items change chemically over time and/or if they are hazardous. If you encounter a bottle or container with a substance in it that you can't identify, you may need to have the material analyzed by a local laboratory (try the Yellow Pages under "laboratories analytical") to determine what the substance is and how to dispose of it properly.

## Biological Hazards (Pathogens)

- Artifacts acquired from latrines, middens (refuse deposits), and graves.
- Objects in storage areas contaminated with bird, bat, or rodent droppings or excrement from other types of animals.
- Objects that can cause puncture wounds.
- Objects stored in damp, dusty or otherwise substandard storage conditions.

**Recommended Action:** Pathogens are bacteria or viruses that can cause diseases such as rabies, tetanus, hantavirus, valley fever, etc. Molds and fungi

that cause illnesses are also considered pathogens. Fortunately, most pathogens may not survive long under normal museum conditions.

Always wear gloves and protective clothing. Wash your hands after handling artifacts in these conditions. Avoid stirring up dust. Wear a respirator or a mask to avoid breathing in dust polluted with animal droppings, molds, and fungi (for more information, see Respirators in this chapter, page 2.34).

Collections care personnel should take special precautions when handling artifacts from latrines, middens, and graves that may have been in contact with fecal material, parasites, and corpses. Such artifacts should be thoroughly cleaned before putting them into storage. Fumigants and insecticides may be useless against some pathogenic microorganisms. Freezing contaminated objects may preserve some pathogens.

If for any reason you think that the objects that have been unearthed are Native American, you should refer to the section in this handbook on Native American Graves Protection and Repatriation Act (NAGPRA). This section contains information on what to do if Native American remains or burial items are found in a park unit. See Chapter 4, pages 4.19–4.24.

Museum and archeological personnel may be exposed to certain diseases due to the nature and/or circumstances of their work. Such diseases include the following:

Lyme disease is a bacterial infection contracted through the bite of the western black-legged tick.

Hantavirus is a virus which infects people who inhale airborne particles of urine, droppings or saliva from infected rodents.

Valley fever is an infection which primarily affects the lungs, caused by breathing dust and soils contaminated with a particular fungus.

Histoplasmosis is contracted from contact with bird, chicken, or bat droppings or recently disturbed contaminated soil.

See the attachments (Figures 4, 5, 6, 7) located at the end of this section for further information on these diseases and measures to avoid exposure to them.

## Biological Hazards (Fauna)

- Spiders
- Ticks
- Insects
- Poisonous snakes

**Recommended Action:** In general to prevent bites from spiders, insects, and snakes, work in a well-lighted area. Wear gloves and protective clothing. Exercise caution in moving objects and boxes that have not been disturbed for a long time.

People who spend time in brushy and wooded areas are at increased risk of exposure to ticks that can transmit diseases when they bite. When working in areas likely to be infested with ticks, wear long sleeves and long pants tucked into socks. Wear a hat with hair tied back. Use insecticides to kill or repel ticks. After outdoor activities, inspect yourself carefully for ticks. Remove any attached ticks promptly or seek medical attention.

Certain ticks are carriers of a serious bacterial infection called Lyme disease. First discovered in 1975, reports of this disease have increased substantially in recent years. See Figure 4 for further information and preventive measures.

## LYME DISEASE FACTS

(FIGURE 4)

**Source:**

**Developed by the Association of State and Territorial Directors of Health Promotion and Public Health Education with funding from the National Center for Infectious Diseases of the US Center for Disease Control and Prevention under Cooperative Agreement U50/CCU 12359. For copies visit <http://astdhpphe.org/infect/lyme.html>.**

## LYME DISEASE

- Lyme disease is a rapidly emerging bacterial infection that is spread to people by the bite of infected ticks.
- Lyme disease can cause a rash, flu-like symptoms, and aching joints.
- Lyme disease can be treated with antibiotics. Without treatment, Lyme disease can cause serious, long-term health problems.
- To prevent Lyme disease: 1) protect yourself from tick bites, 2) remove attached ticks promptly, and 3) get early diagnosis and treatment.

### **What is Lyme disease?**

Lyme disease is an infection transmitted by the bite of certain, very small, infected ticks. Lyme disease gets its name from the town of Lyme, Connecticut, where the illness was first identified in the United States in 1975.

### **What is the infectious agent that causes Lyme disease?**

Lyme disease is caused by a corkscrew-shaped bacterium, or spirochete, called *Borrelia burgdorferi*. Ticks infected with the bacterium spread the disease to humans.

### **Where is Lyme disease found?**

Cases of Lyme disease have been reported by nearly every state in the United States, but the disease is concentrated in the east coastal states, the north central states, and northern California. Connecticut, Rhode Island, New York, New Jersey, Delaware, Pennsylvania, Maryland, and Wisconsin account for about 90% of all cases. In the Northeast and Great Lakes region, Lyme disease is spread by the black-legged tick, which lives in wooded areas, grasslands, and yards. In the Pacific Northwest, the disease is spread by the western black-legged tick. In the Southeast, the disease is thought to be spread by the black-legged tick.

### **How do people get Lyme disease?**

Ticks become infected with the Lyme disease bacterium by feeding on infected animals, such as mice, chipmunks, and other wild rodents. Lyme disease is passed to humans and other animals when a tick infected with the bacterium bites the person or animal and stays attached long enough (usually more than 36 hours) to take a blood meal.

The tick that spreads Lyme disease has a 2-year life cycle, and feeds once in each of its three life stages -- larvae, nymph, and adult. In the tick's larvae stage, it is tan, the size of a pinhead, and feeds on small animals like mice. During the nymph stage, the tick is the size of a poppy seed, beige or partially transparent, and feeds on larger animals such as cats, dogs, and humans. Adult ticks are black and/or reddish and feed on large mammals such as deer, dogs, and humans.

### **What are the signs and symptoms of Lyme disease?**

The early stage of Lyme disease is usually marked by one or more of these signs and symptoms:

- Tiredness
- Chills and fever
- Headache
- Muscle and/or joint pain
- Swollen lymph glands
- A characteristic skin rash, called erythema migrans

The skin rash is a red circular patch about 2 inches in diameter that appears and expands around the site of the tick bite. The center may clear as it enlarges, resulting in a "bull's-eye" appearance. The rash may be warm, but it usually is not painful or itchy. Some infected people do not recognize the early symptoms and are diagnosed only after complications occur.

#### **What complications can result from Lyme disease?**

Persons who did not have or did not recognize the early symptoms and who did not receive treatment can end up with serious complications:

- Arthritis (swelling and pain) in the large joints, which can recur over many years
- Nervous system problems, such as numbness, meningitis (fever, stiff neck, and severe headache), and Bell's palsy (paralysis of the facial muscles, usually on one side)
- Irregularities of the heart rhythm

#### **How soon after exposure do symptoms appear?**

Early symptoms can develop within a week to a few weeks of the tick bite. Other symptoms can appear weeks, months, or years later.

#### **How is Lyme disease diagnosed?**

Lyme disease is diagnosed by a physical examination and medical history. The clinical diagnosis is supported by laboratory testing. Diagnosis of Lyme disease can be difficult. Current tests are not completely accurate, and the symptoms can mimic those of other diseases. Diagnosis is easiest when there is a skin rash.

#### **Who is at risk for Lyme disease?**

Lyme disease can affect anyone. Persons who spend time in brushy and wooded areas are at increased risk of exposure. The chances of being bitten by a tick are greatest during times of the year when ticks are most active. Deer ticks in the nymph stage are active from mid-May to mid-August. Adult ticks are most active in mid- to late fall and early spring.

#### **What is the treatment for Lyme disease?**

Lyme disease is treatable with antibiotics taken for 3 to 4 weeks. More difficult cases may require longer treatment and combinations of drugs. Re-infection from tick bites is possible after treatment.

#### **How common is Lyme disease?**

Lyme disease is the most common disease spread by ticks in the United States. More than 16,000 cases were reported by 45 states in 1996. However, because of considerable under-reporting and misdiagnosis, the actual number of cases is probably several times higher.

**Is Lyme disease an emerging infectious disease?**

Yes. Lyme disease is a rapidly emerging infectious disease. Since it was first recognized in the United States in 1975, reports of Lyme disease have increased substantially, and the disease is now found in several regions of the country. Factors contributing to the rise in Lyme disease in humans is a thriving tick population and the expansion of suburbs into formerly wooded areas, which increases people's exposure to infected ticks.

**How can Lyme disease be prevented?**

A Lyme disease vaccine is under development but is not yet available. The only sure way to prevent the disease is to avoid exposure to infected ticks. Especially avoid areas where wild mice might live, such as the edges of yards, fields, and woods with low, dense groundcover. If this is not possible, you can reduce your risk by taking these precautions:

- During outside activities, wear long sleeves and long pants tucked into socks. Wear a hat, and tie hair back.
- Use insecticides to repel or kill ticks. Repellents containing the compound DEET can be used on exposed skin except for the face, but they do not kill ticks and are not 100% effective in discouraging ticks from biting. Products containing permethrin kill ticks, but they cannot be used on the skin -- only on clothing. When using any of these chemicals, follow label directions carefully. Be especially cautious when using them on children.
- After outdoor activities, check yourself for ticks, and have a "buddy" check you, too. Check body areas where ticks are commonly found: behind the knees, between the fingers and toes, under the arms, in and behind the ears, and on the neck, hairline, and top of the head. Check places where clothing presses on the skin.
- Remove attached ticks promptly. Removing a tick before it has been attached for more than 24 hours greatly reduces the risk of infection. Use tweezers, and grab as closely to the skin as possible. Do not try to remove ticks by squeezing them, coating them with petroleum jelly, or burning them with a match.
- Large brown ticks that are commonly found on dogs and cattle do not carry the Lyme disease bacterium. If you remove a very small tick and want to have it tested for Lyme disease, place it in a clean pill vial or tight-sealed plastic storage bag with a moistened cotton swab. Contact your health-care provider and local health department.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health-care provider. If you have any questions about the disease described above, consult a health-care provider.

# HANTAVIRUS PUBLIC HEALTH FACT SHEET

(FIGURE 5)

Courtesy of the California Department of Health Services  
Institutions Program. For copies visit [http://www.dhs.ca.gov/ps/ddwem/  
environmental/Institutions/default.htm](http://www.dhs.ca.gov/ps/ddwem/environmental/Institutions/default.htm).

## HANTAVIRUS PULMONARY SYNDROME

### **What is Hantavirus pulmonary syndrome?**

Hantavirus pulmonary syndrome is a rare, but often fatal, disease of the respiratory system caused by a virus transmitted to humans through the urine, feces and saliva of wild rodents.

### **Who gets Hantavirus Pulmonary syndrome?**

Anyone of any age can become infected with Hantavirus. A number of the cases reported were individuals in excellent physical condition.

### **How is it spread?**

The disease is transmitted to humans through the urine, feces, and saliva of wild rodents primarily the deer mouse but not necessarily limited to that species. The most widely reported conditions associated with the transmission of the disease is cleaning or occupying confined spaces lacking adequate ventilation that are heavily infested with rodents. Also, direct contact with rodents (bites, saliva) has been implicated in the transmission of the disease.

### **What are the symptoms?**

The illness starts with flu like symptoms, including fever, headache, muscle ache, and vomiting or diarrhea. After the first phase of the disease, shortness of breath and coughing usually appear. In a significant number of cases the disease progresses rapidly to respiratory failure and death. Symptoms usually appear one to five weeks after exposure to the rodents.

### **What is the treatment?**

There is no specific cure for the disease. The course of treatment is usually supportive, attempting to maintain the respiratory system while the body's immune system attempts to fight off the virus.

### **What can I do to prevent infection?**

Good sanitation is the key to preventing and controlling rodent infestations. Measures you should undertake include:

1. Rodentproof – Thoroughly inspect exterior of structures for any openings or spaces that would allow rodent entry. Typical routes of entry include poorly sealed crawl spaces, areas where piping and wiring enter buildings, and doors that fit poorly. One-quarter inch openings will allow rodent entry. Access to roofs should be prevented by trimming back foliage and removing or modifying any other means of access. Roofs should be inspected for signs of rodent activity or damage in such areas as overlapping rooflines. Openings should be sealed with steel wool, metal flashing, or concrete. Deteriorated foundations should be properly repaired.

2. **Cleaning** – Keeping structures clean, especially in food services areas goes a long way toward controlling rodent problems. Rodents will be discouraged from occupying structures unless there is a source of food and water. Cleaning to remove food sources and storing food in rodentproof containers or six inches above the ground is a very effective means of discouraging these pests. Also all areas of buildings should be inspected to locate problem areas and appropriate action taken to discourage rodents.

3. **Physical and chemical control** – Traps, glueboards, and EPA approved rodenticides should be used continuously to kill rodents. Constant monitoring is essential for maintaining control. Gloves should be used when removing dead rodents.

4. **Outdoors** – Clear brush, grass, and junk away from the building foundations to eliminate a source of nesting material.

#### **Safety precautions for cleanup**

Remember that hantavirus is transmitted primarily by inhalation of dust contaminated with virus from rodent secretions. Therefore, it is very important not to disturb and stir up materials into the air while cleaning. Taking the following safety precautions will reduce the risk of infection from cleanup:

1. Ventilate the area to be cleaned the night before by opening doors and windows.
2. Use rubber gloves.
3. Use sanitizers such as bleach at maximum recommended concentrations to dead rodents, rodent droppings, nests, contaminated traps, and surrounding area and allow 15 minutes contact time before removal.
4. Clean the affected area with a sponge or mop. **DO NOT SWEEP OR VACUUM.**
5. Double bag the disinfectant – soaked rodent and cleanup materials (newspaper, paper towels, etc.) securely in plastic bags and seal.
6. Wash gloved hands in disinfectant and then in soap and water. Thoroughly wash hands with soap and water after removing the gloves. Dispose of gloves and cleanup material with other household waste.

**How can I get more information?**

Contact the Department of Health Services, Institutions Program at (916) 445-0498 or visit the website at: <http://www.dhs.cahwnet.gov> or the U.S. Centers for Disease Control at <http://www.cdc.gov/>.

## VALLEY FEVER FACTS

(FIGURE 6)

**Source:**

**Developed by the Association of State and Territorial Directors of Health Promotion and Public Health Education with funding from the National Center for Infectious Diseases of the US Center for Disease Control and Prevention under Cooperative Agreement U50/CCU 12359. For copies visit <http://astdhpphe.org/infect/valley.html>.**

## VALLEY FEVER

- Valley fever is an emerging and sometimes deadly fungus infection.
- The valley fever fungus lives in soil and is spread through the air.
- Farmers, construction workers, and others who engage in activities that disturb the soil are at highest risk for valley fever. People with weak immune systems and persons of certain racial groups can become seriously ill from the infection.
- Valley fever is treatable with fungus-killing medicines.
- Persons at risk for valley fever should avoid exposure to dust and dry soil in areas where valley fever is common.

### **What is valley fever?**

Valley fever is another name for the sometimes deadly infection coccidioidomycosis. It is called valley fever because the organism that causes it is commonly found in the soil of the southwestern United States, Mexico, and parts of Central and South America.

Valley fever usually affects the lungs. When it affects other parts of the body, it is called disseminated valley fever.

### **What is the infectious agent that causes valley fever?**

Valley fever is caused by *Coccidioides immitis*, a fungus. The fungus produces spores that can be inhaled when they get into the air. Spores are hardy forms of the fungus that can live for a long time in harsh environmental conditions such as heat, cold, and drought.

### **Where is valley fever found?**

The valley fever fungus grows naturally in soil in the southwestern United States and in parts of Central and South America.

### **How do people get valley fever?**

Valley fever is spread through the air. If soil containing the valley fever fungus is disturbed by construction, natural disasters, or wind, the fungus spores get into the air. People can breathe in the spores and get valley fever. The disease is not spread from person to person.

### **What are the signs and symptoms of valley fever?**

About 60% of infected persons have no symptoms. The rest develop flu-like symptoms that can last for a month and tiredness that can sometimes last for longer than a few weeks. A small percentage of infected persons (<1%) can develop disease that spreads outside the lungs to the brain, bone, and skin (disseminated disease). Without proper treatment, valley fever can lead to severe pneumonia, meningitis, and even death.

### **How is valley fever diagnosed?**

Valley fever is diagnosed with a blood test or culture.

### **Who is at risk for valley fever?**

Anyone can get valley fever, but people who engage in activities that disturb the soil are at increased risk. They include:

- Farmers
- Construction workers
- Military personnel
- Archaeologists

People with weakened immune systems are at increased risk for disseminated disease. HIV infection, as well as medical advances like chemotherapy and organ transplants, cripple the immune system and weaken resistance to fungus infections. Others at increased risk for disseminated disease are: elderly persons, African-Americans, Asians, and women in the third trimester of pregnancy.

**What is the treatment for valley fever?**

Valley fever can usually be treated with fungus-killing medicines.

**How common is valley fever?**

An estimated 50,000 to 100,000 persons develop symptoms of valley fever each year in the United States, with 35,000 new infections per year in California alone. In Arizona, the incidence of reported cases was 15 per 100,000 in 1995.

**Is valley fever an emerging infectious disease?**

Yes. Valley fever is on the rise because of the growing number of people who are moving to areas where the disease is common (such as Arizona) and increases in the number of persons with weakened immune systems. Recent natural disasters have also triggered a rise in valley fever cases. The central valley of Southern California had a 4-year epidemic of valley fever in the early 1990s after a severe drought. Cases of valley fever also increased in persons exposed to billowing dust released by the January 1994 earthquake in Northridge, California.

**How can valley fever be prevented?**

There is no vaccine against valley fever. Persons at risk for valley fever should avoid exposure to dust and dry soil in areas where valley fever is common.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health-care provider. If you have any questions about the disease described above or think that you might have a fungus infection, consult a health-care provider.

## HISTOPLASMOSIS FACTS

(FIGURE 7)

**Source:**

**Developed by the Association of State and Territorial Directors of Health Promotion and Public Health Education with funding from the National Center for Infectious Diseases of the US Center for Disease Control and Prevention under Cooperative Agreement U50/CCU 12359. For copies visit <http://astdhpphe.org/infect/histo.html>.**

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## HISTOPLASMOSIS

- Histoplasmosis [his-toh-plaz-MOH-sis] is a fungal infection that varies in symptoms and seriousness.
- Histoplasmosis usually affects the lungs and causes a short-term, treatable lung infection. When it affects other parts of the body, it is called disseminated histoplasmosis. Disseminated histoplasmosis can be fatal.
- The histoplasmosis fungus lives in soil, especially soil that is enriched with bat or bird droppings.
- People get histoplasmosis when they breathe in dust that contains the fungus.
- Histoplasmosis is treatable with fungus-killing medicines.
- To prevent histoplasmosis: 1) avoid exposure to dust from soil that might be contaminated with bat or bird droppings, and 2) avoid disturbing accumulations of bat or bird droppings.

### **What is histoplasmosis?**

Histoplasmosis is an infection that varies in symptoms and seriousness. It usually affects the lungs. When it affects other parts of the body, it is called disseminated histoplasmosis.

### **What is the infectious agent that causes histoplasmosis?**

Histoplasmosis is caused by *Histoplasma capsulatum*, a fungus. The fungus produces spores that can be inhaled when they get into the air. Spores are hardy forms of the fungus that can live in the environment for a long time.

### **Where is histoplasmosis found?**

The histoplasmosis fungus is found throughout the world. The fungus grows naturally in soil in some areas of the United States, mostly in the midwestern and southeastern states and along the Ohio and Mississippi River valleys. It thrives in soil that is enriched with bat or bird droppings.

### **How do people get histoplasmosis?**

Histoplasmosis is spread through the air. If soil containing the histoplasmosis fungus is disturbed, the fungus spores get into the air. People can breathe in the spores and get histoplasmosis. The disease is not spread from person to person.

### **What are the signs and symptoms of histoplasmosis?**

Most infected persons have no symptoms. When symptoms occur, they vary widely, depending on the form of the disease.

The lung infection can be short-term (acute) and relatively mild, or it can be long-term (chronic) and serious. Symptoms of the acute lung infection are tiredness, fever, chills, chest pains, and a dry cough. The chronic lung infection is like tuberculosis and occurs mostly in persons who already have lung disease. It can progress over months or years and can scar the lungs.

Disseminated histoplasmosis results in a variety of serious symptoms and can involve all body organs. The liver and spleen usually become enlarged, and sores in the mouth or gastrointestinal tract can develop. Disseminated histoplasmosis can be fatal.

**How soon after exposure do symptoms appear?**

Symptoms of acute disease usually appear in 5 to 18 days (usually 10 days) after exposure.

**How is histoplasmosis diagnosed?**

Diagnosis can be made by laboratory culture or a blood test. A skin test is available but is useful only for outbreak investigations, not for diagnosis.

**Who is at risk for histoplasmosis?**

Anyone can get histoplasmosis. Chronic lung infections are more common in males than in females, and particularly in persons with chronic lung disease. Disseminated histoplasmosis occurs most often in infants, young children, and persons with weakened immune systems, such as those with cancer or HIV infection.

**What complications can result from histoplasmosis?**

Acute histoplasmosis can keep getting worse or can become chronic. Acute histoplasmosis can also spread from the lungs to other organs and lead to the disseminated form of the disease, especially in persons with weakened immune systems.

**What is the treatment for histoplasmosis?**

Persons with mild disease usually get better on their own. Severe cases of acute histoplasmosis and all cases of chronic and disseminated disease are treated with fungus-killing medicines.

**How common is histoplasmosis?**

Infection with histoplasmosis is common, but the disease is rare. As many as 80 percent of persons living in U.S. areas where the fungus is common have a positive skin test, meaning they have had the infection in the past. However, most of these people do not have a history of histoplasmosis symptoms.

**Is histoplasmosis an emerging infectious disease?**

Yes. Histoplasmosis is on the rise, mainly because of the growing number of persons with weakened immune systems. These include persons with HIV infection, those who have had a bone marrow or organ transplant, and those receiving chemotherapy for cancer.

**How can histoplasmosis be prevented?**

- It is not practical to test or decontaminate all areas that are known to be or might be contaminated with the histoplasmosis fungus, but these steps can reduce the risk of exposure:
- Avoid areas where the fungus might be growing, especially areas with accumulations of bird or bat droppings. The fungus often grows around old chicken houses, in caves and other areas where bats live, and around starling and blackbird roosts.
- Avoid disturbing accumulations of bat or bird droppings, and minimize exposure to dust in potentially contaminated sites. Before stirring up the soil, spray the area with a mist of

water.

- When working in high-risk areas, wear disposable clothing and a dust mask that covers the nose and mouth.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health-care provider. If you have any questions about the disease described above or think that you might have a fungus infection, consult a health-care provider.

# Protective Clothing and Equipment

## Introduction

Some museum hazards are subtle and it is common for staff working with collections not to be aware that they have been exposed to dangerous substances. The use of protective clothing is the first line of defense against exposure to dangerous substances and should be worn when working with collections. Protective clothing also minimizes the possibility of damage to objects from jewelry, pens, pencils, buttons and belt buckles on a person's clothing.

Most protective clothing and equipment can be purchased at hardware and drug stores or conservation supplies companies. See the MCMH Volume I, Sources for Museum Supplies.

## Clothing

### Smocks, coveralls and lab coats

Smocks, coveralls, and lab coats serve as a protection for both the clothing of staff who work with museum objects and the objects with which they work. Smocks and coveralls that are worn while working with collections should be disposable and discarded at the end of the shift each day, or washed separately from other garments on a regular basis. This practice reduces the danger of exposing other clothing to toxic substances.

### Gloves

Gloves are usually worn when handling museum objects. They protect objects from acids and oils on the skin and fingerprints. They can protect the wearer from contaminants, skin irritation, and soiling caused by substances in or on the objects.

It is important to choose the right glove for use with a particular type of object in a particular situation. Staff safety, object protection, cost, comfort and maintenance are factors used in determining which gloves are best to use and when.

Types of gloves to consider include:

Nitrile: Lightweight rubber. Similar in appearance to vinyl and latex. Provides excellent resistance to many solvents and hazardous materials.

Cotton: White, lightweight, soft, ambidextrous and slightly stretchable. Usually have a non-finished cuff, a less distinguished thumb, provide a less-sensitive touch, soil easily, tend to lint, snag, lose shape, and shrink after washing. Work well when worn under latex gloves to absorb moisture. Cotton gloves should not be used for working with objects which may be contaminated (refer to the section on Contaminated Collections in this chapter for more information). Traditional cotton or nylon gloves that can trap contaminants in their fibers are of little use against poisonous or infectious artifacts.

Deluxe cotton: White, heavyweight, seamed, soft, comfortable, more durable with a finished cuff. Fit better, hold shape after washing but provide more sensitivity. Available in three sizes.

Non-slip cotton: White, seamed, comfortable, minimal lint with a finished cuff. Small PVC dots on palm and inner finger surfaces provide a good grip. Less touch sensitivity. Available in three sizes.

Nylon: White, seamed, ambidextrous, comfortable, and lintless. Available with or without a finished cuff; wash better than cotton gloves. Reduced touch sensitivity, slippery, and prone to developing pills after extended use.

Copolymer: Lightweight polyethylene plastic, ambidextrous, seamed, economical, and easy to remove. Fit poorly, are slippery, have a static charge, provide poor dexterity, and can be uncomfortable as hands sweat.

Vinyl: Available in various weights, vinyl provides a close fit and good sensitivity. Available in ambidextrous and hand-specific and powdered and non-powdered styles. Economical.

Latex: Many varieties available. Available in a variety of weights. Provides a close fit and good sensitivity. Can be ambidextrous or hand-specific. Can be powdered or not. Economical. Latex gloves should not be used for working with objects which may be contaminated (refer to the section on Contaminated Collections in this chapter for more information).

Note: Be aware that some people are seriously allergic to latex products. “Vinyl” is often used to describe many types of plastic, most of which are not appropriate for use with museum objects. “Vinyl” and “latex” are often used interchangeably so you might have to check with manufacturer for clarification.

## Equipment

### Respirators

Respirators are the last defense against inhaling hazardous dusts, vapors, fumes or gases. However, an employee must first undergo a physical exam to verify the ability to breathe through a respirator with no risk to his/her health. The law also requires that employees be fit tested and trained before using respirators to learn how to select, put on, take off, and maintain them. Most respirators can't be worn with facial hair, and if you wear glasses you may require a special type to get a good fit. Keep in mind that different types of filters capture different types of particulates. A filter designed to trap silica may not protect a person from solvent vapors. Check the appropriate Material Safety Data Sheet for the type of respirator needed.

There are two main types of respirators:

- Air purifying (i.e., simple dust masks and canister-type gas masks.) They block harmful particulates from getting into your lungs.
- Air supplying (i.e. Self-Contained Breathing Apparatus (SCBA) and airline respirators that provide air from a tank or compressor.) These devices are used when there is too little oxygen or when greater protection is needed.

For additional information specifically relating to the use of respirators by State Park employees, refer to DPR's *Respiratory Protection Handbook*, revised in 2003, and to DPR Administration Manual (DAM), Chapter 12 Employee Safety.

### Eye protection:

Occasionally, it is necessary to protect one's eyes when working with collections. You may need protection from fumes or particulates. The most common types of eye protection are as follows:

- Shatterproof safety glasses
- Goggles
- Face shields

If you wear prescription glasses you must have gear that corrects your vision or that can be worn over your glasses

# Material Safety Data Sheets (MSDS)

## MSDS Forms

In the course of your work, you or other curatorial staff may occasionally be exposed to potentially hazardous chemicals. The barrier coats you use to mark objects, for example may fall into this category. State law mandates that manufacturers or local vendors automatically provide MSDS forms for new purchases of toxic materials. In turn, DPR is required to make MSDS forms (and related training, as necessary) available to employees assigned to work with hazardous substances. If volunteers are involved in cataloging or other activities during which they are exposed to dangerous substances, they also must have access to the forms and any related training.

MSDS forms include topics such as these:

- Ingredients by chemical name.
- Emergency treatment procedures.
- Potential health effects.
- First aid measures.
- Handling and storage recommendations.
- Personal protection measures.
- Disposal considerations.

A sample MSDS form (Figure 8) is located at the end of this section. You will need to obtain your own sheets since the information is updated periodically and the products themselves may vary from manufacturer to manufacturer. MSDS forms for many chemicals may be obtained online at <http://www.emdchemicals.com/analytics/search/searchresults.asp>.

For additional information, refer to DAM, Chapter 1200 Employee Safety, and Sections 1240.4 and 1240.5. Park unit Maintenance chiefs or HAZMAT (Hazardous Materials) Coordinators may also be able to provide information.

# **Material Data Safety Sheet (MSDS) Acetone**

(FIGURE 8)

**Source: Website for EMD Chemicals.  
<http://www.emdchemicals.com/analytics/search/searchresults.asp>**

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# MATERIAL SAFETY DATA SHEET SAMPLE

## Section 1. Product and Company Identification

Product Name: Acetone, For Instrumental Analysis Product Code AX0118

Manufacturer: EMD Chemicals Inc.  
P.O. Box 70  
480 Democrat Road  
Gibbstown, NJ 08027

Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.

Effective Date: 3/3/2003

For more information or in case of an emergency call: 856-423-6300

Technical Service: Monday-Friday: 8:00 AM - 5:00 PM

800-424-9300 CHEMTREC (USA)

613-996-6666 CANUTEC (Canada)

24 Hours/Day: 7 Days/Week

Synonym DIMETHYL KETONE; 2-PROPANONE

Material Uses Analytical reagent.

Chemical Family Aliphatic ketone.

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Section 2. Composition and Information on Ingredients Component CAS # % by Weight  
ACETONE 67-64-1 100

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## Section 3. Hazards Identification

Physical State and Appearance Liquid.

Emergency Overview DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR.

VAPOR MAY CAUSE FLASH FIRE.

HARMFUL IF INHALED OR SWALLOWED.

CAUSES EYE AND SKIN IRRITATION.

CAUSES DAMAGE TO THE FOLLOWING ORGANS: RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Potential Acute Health Effects: Eyes Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching. Skin Hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or,

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occasionally, blistering. Inhalation Hazardous in case of inhalation. Ingestion Hazardous in case of ingestion.

Potential Chronic Health Effects: Carcinogenic Effects This material is not known to cause cancer in animals or humans. Additional information See Toxicological Information (section 11)

Medical Conditions Aggravated by Overexposure: Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

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#### Section 4. First Aid Measures

**Eye Contact** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Inhalation** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

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#### Section 5. Fire Fighting Measures

**Flammability of the Product** Product will burn.

**Auto-ignition Temperature** 464.9°C (868.8°F)

**Flash Points** Closed cup: -18.1°C (-0.6°F).

**Flammable Limits** LOWER: 2.6% UPPER: 12.8% **Products of Combustion** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances** Extremely flammable in presence of open flames, sparks and static discharge, of shocks, of heat, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances** Risks of explosion of the product in presence of static discharge:

Extremely flammable in presence of open flames, sparks and static discharge.

Extremely explosive in presence of open flames, sparks and static discharge.

Risks of explosion of the product in presence of mechanical impact:

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Extremely flammable in presence of shocks.

Extremely explosive in presence of shocks.

Fire Fighting Media

and Instructions SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Protective Clothing (Fire) Be sure to use an approved/certified respirator or equivalent.

Special Remarks on Fire Hazards Dangerous fire and explosion risk. Vapor may travel considerable distance to source of ignition and flash back.

Special Remarks on Explosion Hazards Not available.

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## Section 6. Accidental Release Measures

Small Spill and Leak Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill and Leak Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Spill Kit Information The following EMD Chemicals Inc. SpillSolv® absorbent is recommended for this product: SX1330 Solvent Treatment Kit

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## Section 7. Handling and Storage

Handling Keep away from heat, sparks and flame. Do not ingest. Do not breathe gas/fumes/vapor/spray. Do not get in eyes, on skin, or on clothing.

Storage Keep container in a cool, well-ventilated area.

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## Section 8. Exposure Controls/Personal Protection

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection

Eyes Safety glasses.

Body Synthetic apron.

Respiratory Dust respirator. Be sure to use an approved/certified respirator or equivalent.

Wear appropriate respirator when ventilation is inadequate.

Hands Gloves (impervious).

Feet Not applicable.

Protective Clothing (Pictograms)

Personal Protection in Case of a Large Spill Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name Exposure Limits

ACETONE BAUA (Germany, 1997).

Spitzenbegrenzung: 4800 mg/m<sup>3</sup>

Spitzenbegrenzung: 2000 ppm

MAK: 1200 mg/m<sup>3</sup>

MAK: 1200 mg/m<sup>3</sup>

MAK: 500 ppm

DK-Arbejdstylsinet (Denmark, 1996).

GV: 600 mg/m<sup>3</sup>

GV: 600 mg/m<sup>3</sup>

GV: 250 ppm

INRS (France, 1996).

VME: 1800 mg/m<sup>3</sup>

VME: 1800 mg/m<sup>3</sup>

VME: 750 ppm

National Authority for Occupational Safety/Health (Ireland, 1999).

STEL: 3560 mg/m<sup>3</sup>

STEL: 1500 ppm

OEL: 1780 mg/m<sup>3</sup>

OEL: 750 ppm

Arbeidsinspectie (Netherlands, 1999).

TGG 8 uur: 1780 mg/m<sup>3</sup>

TGG 8 uur: 1780 mg/m<sup>3</sup>

TGG 8 uur: 750 ppm

N-Arbejdstylsinet (Norway, 1996).

AN: 295 mg/m<sup>3</sup>

AN: 295 mg/m<sup>3</sup>

AN: 125 ppm

EH40-OES (United Kingdom (UK), 1997).

STEL: 3620 mg/m<sup>3</sup>

STEL: 1500 ppm

TWA: 1810 mg/m<sup>3</sup>

TWA: 750 ppm

ACGIH (United States, 1996).

STEL: 1782 mg/m<sup>3</sup>  
STEL: 1782 mg/m<sup>3</sup>  
STEL: 750 ppm  
TWA: 1188 mg/m<sup>3</sup>  
TWA: 1188 mg/m<sup>3</sup>  
TWA: 500 ppm  
NIOSH REL (United States, 1994).  
TWA: 590 mg/m<sup>3</sup> Period: 10 hour(s).  
TWA: 250 ppm Period: 10 hour(s).  
OSHA (United States, 1989).  
STEL: 2400 mg/m<sup>3</sup>  
TWA: 1800 mg/m<sup>3</sup>  
OSHA Final Rule (United States, 1989).  
STEL: 2400 mg/m<sup>3</sup>  
STEL: 1000 ppm  
TWA: 1800 mg/m<sup>3</sup>  
TWA: 750 ppm  
AUVA (Austria, 1995).  
Spitzenbegrenzung: 3560 mg/m<sup>3</sup> 3 times per shift, Period: 60 minute(s).  
Spitzenbegrenzung: 1500 ppm 3 times per shift, Period: 60 minute(s).  
TWA: 1780 mg/m<sup>3</sup>  
TWA: 750 ppm  
Belgium Minister of Labour (Belgium, 1998).  
VCD: 2415 mg/m<sup>3</sup>  
VCD: 1000 ppm  
VL: 1806 mg/m<sup>3</sup>  
VL: 750 ppm  
Tyterveyslaitos (Finland, 1998).  
STEL: 1500 mg/m<sup>3</sup>  
STEL: 630 ppm  
TWA: 1200 mg/m<sup>3</sup>  
TWA: 500 ppm  
AFS (Sweden, 1996).  
KTV: 1200 mg/m<sup>3</sup>  
KTV: 500 ppm  
NGV: 600 mg/m<sup>3</sup>  
NGV: 250 ppm

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## Section 9. Physical and Chemical Properties

Odor Pungent.

Color Colorless.

Physical State and Appearance Liquid.

Molecular Weight 58.09 g/mole

Molecular Formula C<sub>3</sub>-H<sub>6</sub>-O

pH Not available.  
Boiling/Condensation Point 56.17°C (133.1°F)  
Melting/Freezing Point -94.2°C (-137.6°F)  
Critical Temperature 234.9°C (454.8°F)  
Specific Gravity 0.791 (Water = 1)  
Vapor Pressure Not available.  
Vapor Density 2 (Air = 1)  
Odor Threshold 100 ppm  
Evaporation Rate 6.06 compared to(n-BUTYL ACETATE=1)  
LogKow Not available.  
Dispersion Properties See solubility in water.  
Solubility Soluble in water.

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#### Section 10. Stability and Reactivity

Stability and Reactivity The product is stable.  
Conditions of Instability Not available.  
Incompatibility with Various Substances Extremely reactive or incompatible with oxidizing agents, acids.  
Rem/Incompatibility Not available.  
Hazardous Decomposition Products COx carbon oxides (CO, CO2)  
Hazardous Polymerization Will not occur.

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#### Section 11. Toxicological Information

RTECS Number:  
Acetone AL3150000  
Toxicity Acute oral toxicity (LD50): 5340 mg/kg [Rabbit].  
Chronic Effects on Humans Not available.  
Acute Effects on Humans Hazardous in case of eye contact (irritant). Inflammation of the eye is characterized by redness, watering, and itching. Hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Hazardous in case of inhalation. Hazardous in case of ingestion.  
Synergetic Products (Toxicologically) Not available.  
Irritancy Draize Test (Rabbit):  
Eyes: 20mg/24h. Reaction: Moderate.  
Skin 500 mg/24h Mild  
Sensitization Not available.  
Carcinogenic Effects This material is not known to cause cancer in animals or humans.  
Toxicity to Reproductive System Tests on laboratory animals for reproductive effects are cited in Registry of Toxic Effects on Chemical Substances (RTECS).  
Teratogenic Effects Not available.

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Mutagenic Effects Tests on laboratory animals for mutagenic effects are cited in Registry of Toxic Effects of Chemical Substances (RTECS).

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#### Section 12. Ecological Information

Ecotoxicity Not available.

BOD5 and COD Not available.

Toxicity of the Products of Biodegradation The products of degradation are less toxic than the product itself.

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#### Section 13. Disposal Considerations

EPA Waste Number U002 D001

Treatment Specified Technology - Incineration to a level below TCA (Total Constituent Analyses) levels. Contact your local permitted waste disposal site (TSD) for permissible treatment sites. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations.

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#### Section 14. Transport Information

DOT Classification Proper Shipping Name: ACETONE

Hazard Class: 3

UN number: UN1090

Packing Group: II

RQ: 5000 lbs. (2268 kg)

TDG Classification Not available.

IMO/IMDG Classification Not available.

ICAO/IATA Classification Not available.

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#### Section 15. Regulatory Information

U.S. Federal Regulations TSCA 4(a) final test rules: ACETONE

TSCA 8(b) inventory: ACETONE

TSCA 12(b) one time export: ACETONE

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: ACETONE

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: ACETONE:

Fire Hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard

SARA 313 toxic chemical notification and release reporting: No products were found.

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean air act (CAA) 112 accidental release prevention: No products were found.

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Clean air act (CAA) 112 regulated flammable substances: No products were found.  
Clean air act (CAA) 112 regulated toxic substances: No products were found.  
WHMIS (Canada) CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).  
Class D-2B: Material causing other toxic effects (TOXIC).  
CEPA DSL: ACETONE  
This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.  
International Regulations  
EINECS Acetone 200-662-2  
DSCL (EEC) R11- Highly flammable.  
R36- Irritating to eyes.

International Lists Australia (NICNAS): ACETONE

Japan (MITI): ACETONE

Korea (TCCL): ACETONE

Philippines (RA6969): ACETONE

China: No products were found.

State Regulations Pennsylvania RTK: ACETONE: (environmental hazard, generic environmental hazard)

Massachusetts RTK: ACETONE

New Jersey: ACETONE

California prop. 65: No products were found.

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#### Section 16. Other Information

National Fire Protection Association (U.S.A.)

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Health 1

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Fire Hazard

Reactivity

Specific Hazard

Notice to Reader

The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person

having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

## Back Safety

### Introduction

Museum work often requires lifting, carrying, and reaching in order to move objects from storage to a workroom, from an exhibit room to storage, etc. Safety considerations should always come first. The procedures outlined in this section describe proper handling and techniques to protect your back and limbs from injury, when you are moving and handling objects

### Planning Ahead

- Do not do anything in haste.
- Wear comfortable, supportive, non-slip shoes.
- Consider the size and weight of the materials to be moved.
- Test the load before lifting to make sure you can lift it safely.
- If the object is too heavy or bulky
  - Find Help;
  - Use a cart or hand-truck;
  - Make several trips if a heavy load can be split into smaller loads.
- Make certain the path is clear before you proceed.

## Proper Body Mechanics for Lifting and Carrying

- For good balance, keep feet apart to maintain a wide base of support.
- Point feet in the direction of the move.
- Keep head and shoulders up, chin tucked in, and back arched when lifting.
- Keep weight close to body, grasp the object you are lifting firmly, and stand up straight. (Do not lift or carry an object in a bent-over posture.)
- Don't jerk when you lift object upward.
- Lift steadily with your legs rather than your back.
- Pivot your feet to turn — do not twist.
- If picking up an object below the waist, bend at hips and knees to a squatting position. Keep load close to your body and lift with your legs to bring the load to waist level.
- If you must slide an object across a floor, push — never pull. Be sure the path is clear and get help if you need it.

## Proper Body Mechanics for Reaching

- Obtain a stepstool or stand on a platform to reach objects above the shoulders.
- Decide where you are going to set the load.
- Slide the load toward you and keep it close to your body while moving it.
- Maintain good posture and let your arms and legs do the work instead of your back.
- Kneel, if you must work with or reach objects low to the ground.

## **Two-person Lifting and Carrying**

- One person should direct the move.
- If possible, lift with someone who is close to your own height.
- Both of you should lift the load at the same time using your legs instead of your back.
- Maintain the load at the same height while carrying it.
- Move smoothly as you walk with the load.
- Set the load down together.