

**SECTION 4:**  
**OCCUPATIONAL HEALTH**

**4.1 OCCUPATIONAL EXPOSURE ASSESSMENT**

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The risk that an employee faces on the job is a function of the hazards present and his/her exposure level to those hazards. Exposure and risk assessment is therefore at the heart of all occupational health and industrial hygiene programs. The use of a systematic method to characterize workplace exposures to chemical, physical and biological agents is a fundamental part of this process. Once a thorough and organized characterization of employee hazard exposures has been completed, occupational health program resources can be more effectively allocated to reduce employee health risks. This includes better focus of training programs, improved execution of medical surveillance programs, effective purchase and implementation of control measures, and valuable data for program evaluation.

Exposure assessment supports all occupational health program elements, including the following important program areas:

- Education and Training
- Hazard Communication
- Epidemiology
- Exposure and Compliance Monitoring
- Medical Surveillance
- Radiation Safety
- Hearing Conservation
- Personal Protective Equipment
- Respiratory Protection
- Work Practice Controls
- Administrative Controls
- Engineering Controls
- Hazardous Material Management

**National Park Service Occupational Exposure Assessment Policy**

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The National Park Service has adopted a strategy of comprehensive and systematic exposure assessment emphasizing characterization of all workplace exposures to chemical, physical and biological agents. Parks will establish a comprehensive program of worker exposure assessment using qualified Industrial Hygienists and park employees who have been trained as Workplace Monitors.

**References**

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1. 29 CFR 1910 Subpart Z. Toxic and Hazardous Substances.
2. 29 CFR 1910 and 1926 Agent Specific Regulations.

3. Mulhausen, J.R and J. Damiano. 1998. A Strategy for Assessing and Managing Occupational Exposures. AIHA 349 pp.
4. ACGIH. 2002. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

## Definitions

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*Employee Exposure* is an exposure to chemical, physical or biological agents that occurs in the workplace regardless of the use of personal protective equipment.

*Exposure Assessment* is the qualitative or quantitative determination made by an industrial hygienist or other appropriately trained individual of an employee's exposure to a chemical biological or physical agent.

*Negative Exposure Determination* is the qualitative or quantitative determination made by an experienced industrial hygienist that an employee is not exposed at or above the action level. In many cases, this determination can be made without sampling data. A review of the chemical, physical, biological and toxicological characteristics of the material, quantity of use, frequency of use, conditions under which it is used and past experience with similar operations may be sufficient to characterize exposures to a workplace hazard. In other instances, sampling may be necessary to ascertain the extent of exposure. Sampling may also be required by regulation (e.g., asbestos and lead).

*Positive Exposure Determination* is the qualitative or quantitative determination made by an industrial hygienist that an employee is exposed at or above the action level for a chemical, biological or physical agent. Monitoring may be conducted to verify the determination.

*Exposure Monitoring* is the direct measurement of employee exposure using direct reading instrumentation or sample collection for analysis.

*Industrial Hygiene* is the science and art devoted to the anticipation, recognition, evaluation and control of environmental health hazards in the workplace.

*Industrial Hygienist* is a civil service General Schedule 690 Series employee or equivalent in the private sector.

*Experienced Industrial Hygienist* is a civil service General Schedule 690 Series employee GS-12 and above (or PHS O-4 or above) or any Certified Industrial Hygienist (CIH).

*Workplace Monitor* is an individual trained in exposure monitoring working under the direction of an industrial hygienist.

*Occupational Exposure Limit (OEL)* is an allowable concentration or intensity of a hazardous agent in the employee's immediate work environment over a given period of time. OELs are generally expressed as 8-hour time weighted averages (TWA) or as excursion or short-term exposure limits of 15 or 30-minute duration. The OELs used by NPS are the OSHA Permissible Exposure Limit (PEL) and the Threshold Limit Values published by ACGIH.

*Action Level (AL)* is the level of exposure, described as the concentration over a given period of time, at which exposure control measures must be implemented to reduce the potential for an unacceptable worker exposure. Action levels are prescribed by OSHA regulation for certain agents. In the absence of OSHA-prescribed ALs, NPS will use 50% of the PEL or TLV as the AL.

## **Comprehensive Exposure Assessment**

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A comprehensive exposure assessment program involves a continual process of collecting information, prioritizing controls and gathering follow-up information. Systematic procedures for conducting a comprehensive exposure assessment have been prescribed by the American Industrial Hygiene Association<sup>1</sup> and are described in detail by Mulhausen and Damiano<sup>2</sup>. They are summarized below.

1. *Characterize Exposure:* Gather information to characterize the workplace, workforce and environmental agents. This may be accomplished as part of the job hazard analysis. This involves describing and evaluating the exposures present in the workplace and documenting them in an organized manner.
2. *Assess Exposure:* Assess exposures in the workplace relative to the information available on the workplace, workforce and environmental agents. Exposure monitoring is not essential to exposure assessment. Many occupational exposures can be assessed without monitoring data. Although traditional assessment strategies have emphasized personal monitoring to measure exposure to air contaminants and noise, modeling techniques are more widely accepted and may be required for prospectively assessing an exposure that has not yet begun. Qualitative assessments may be used to screen exposure risks and set priorities. Through this process, groups of similarly exposed workers will be defined [similar exposure groups (SEG)] and their exposure profile will be described. Judgments about the acceptability of each exposure profile are made based on estimated exposure level, severity of health effects and the uncertainty associated with the available information.

<sup>1</sup> AIHA. 1997. White Paper on a Generic Exposure Assessment Standard.

<sup>2</sup> Mulhausen, J.R. and J. Damiano. 1998. *A Strategy for Assessing and Managing Occupational Exposures*, 2<sup>nd</sup> Ed. AIHA Press.

Exposures may be judged as:

- *Unacceptable* — requiring the implementation of controls;
- *Acceptable* — no action is required but routine monitoring may be needed to validate the judgment or ensure that exposures do not become unacceptable; Or
- *Uncertain* — additional information is required to determine the acceptability of the exposure and it may involve modeling, exposure monitoring, biological monitoring or the development of toxicological or epidemiological data.

Exposure assessments will be conducted by experienced Industrial Hygienists.

1. *Gather Additional Information:* Implement prioritized exposure monitoring or the collection of more information on health effects so that uncertain exposure judgments can be resolved with higher confidence. Exposure monitoring may be conducted by a Workplace Monitor under the direction of an experienced Industrial Hygienist.
2. *Implement Health Hazard Controls:* Implement prioritized control strategies for unacceptable exposures.
3. *Reassess Exposure:* Periodically perform a comprehensive re-evaluation of exposures. Determine whether routine monitoring is required to verify that acceptable exposures remain acceptable.
4. *Communicate and Document Findings:* Communicate assessment results to workers and occupational health program managers in a timely manner. Fully document SEGs, their exposure profiles, judgments on the acceptability of exposures, all monitoring results and hazard control recommendations and control plans.

## **Compliance Monitoring**

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Compliance monitoring focuses on the maximum risk employee to determine whether exposures are above or below established limits. It will be conducted as required by agent-specific OSHA Regulation. Specific monitoring requirements for OSHA-regulated agents likely to be encountered by NPS employees are summarized in Table 1.

**Table 1. OSHA Mandated Agent and Program — Specific Monitoring Requirements of note for NPS**

AGENT	REFERENCE	EXPOSURE ASSESSMENT REQUIREMENTS
Lead	29 CFR 1926.62 29 CFR 1910.1025	Work shift & short-term monitoring of representative employees and tasks; Initial, quarterly, semi annually or annually; Objective data permitted
Asbestos	29 CFR 1910.1001 29 CFR 1926.1101	Initial exposure assessment prior to initiating work; Work shift & excursion monitoring; Daily & periodic depending on work classification; Objective data permitted
Inorganic Arsenic	29 CFR 1910.1018	Work shift monitoring; Quarterly or annually depending on concentration
Benzene	29 CFR 1910.1028 46 CFR 197.540	Work shift and short-term monitoring each job class and work area; Initial, semi annual and annual (time of year may be prescribed)
Cadmium	29 CFR 1910.1027 29 CFR 1926.1127	Work shift monitoring of representative employees and tasks; Initial and semi annually
13 Carcinogens	29 CFR 1910.1003	
Acrylonitrile	29 CFR 1910.1045	Work shift monitoring; Initial and monthly or quarterly depending on concentration
Ethylene oxide	29 CFR 1910.1047	Work shift & short-term monitoring each job class and work area; Initial, quarterly and semi annually
Formaldehyde	29 CFR 1910.1048	Work shift & short-term monitoring of representative employees and tasks; Initial, semi annual and annual; Objective data permitted for negative determination.
Butadiene	29 CFR 1910.1051	Work shift & short term monitoring of representative employees and tasks; Initial, quarterly, semi annual or annual; Object data permitted
Noise	29 CFR 1910.95	Area & personal monitoring to determine employee exposure
Respiratory Protection	29 CFR 1910.134	Exposure assessment that includes a reasonable estimate of employee exposure
HAZWOPRER	29 CFR 1910.120	Requires design of an exposure assessment program as part of the Site-Specific Safety and Health Plan
Laboratories	29 CFR 1910.1450	Requires a <i>Chemical Hygiene Plan</i> and an exposure assessment
Dip Tanks	1910.126	Requires evaluation of probable skin contact and effectiveness of airborne contaminant control measures
Abrasive Blasting	29 CFR 1910.94	Evaluation of dust hazards from abrasive blasting
Ionizing Radiation	29 CFR 1910.1096	Exposure assessment required

## Implementation

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### Qualitative Exposure Assessment

Exposure monitoring is not always required to assess exposures. In many cases, occupational exposures can be assessed without monitoring data. Modeling techniques have become widely accepted and may be required to assess an exposure of an upcoming task.

Qualitative exposure assessment may be used initially to determine potential personnel exposures at or above the action level (AL). This determination is to be made by an industrial hygienist that is familiar with the operation or process being evaluated. A positive determination indicates there are personnel exposures above the AL. A negative determination indicates that, based on past sampling results or professional judgment, personnel exposures are not expected to exceed the AL under normal or foreseeable operating conditions. All negative determinations must be fully and accurately documented to support the decision. Initial exposure data could lead to the decision that there is insufficient information available for an immediate positive/negative determination. Further sampling or information gathering may be required to assess exposures. If additional sampling must be conducted, a monitoring plan should be developed.

Initial qualitative assessments should include the following:

- Description of operation, task, or process, including work practices and procedures, frequency and duration of operation and may include a diagram of the work area.
- List of all potentially hazardous materials used, stored, handled, or produced. Include a description of how they are used, amount on hand, and estimated consumption rates. A list of hazardous materials used at the facility will be available as a component of the Park's Hazard Communication Program.
- List of potential physical hazards, such as noise, heat, ionizing and non-ionizing radiation. Include a brief description of their sources.
- List of potential biological or infectious agents
- Direct reading screening measurements for each work area where applicable.
- Description and efficiency of existing controls. Include type of personal protective equipment (PPE), administrative controls, and engineering controls and evaluations of their effectiveness.
- The number of personnel assigned to each work operation/process (total, male and female).

This information may be organized using the attached form "Similar Exposure Group Characterization and Exposure Profile (Process/Task-Based Exposure Assessment)."

### Monitoring Plans

An exposure monitoring plan must be completed for each operation, process or task that requires sampling. This could include sampling needed to characterize exposures that are at or above the AL or sampling required by regulation. The plan should also include assessments needed to document the adequacy of engineering controls such as the function of ventilation systems.

SIMILAR EXPOSURE GROUP CHARACTERIZATION AND EXPOSURE PROFILE (PROCESS/TASK-BASED EXPOSURE ASSESSMENT)		
<b>Unit:</b>	<b>SEG Descriptor:</b>	<b>Date:</b>
<b>Shop or Task:</b>		<b>No. Persons Similarly Exposed</b>

Agent	OEL	Action Level (A.L.)	Exposure Type Route <sup>1</sup>	Frequency/ Duration	Controls <sup>2</sup>	PPE	Exposure Risk Rating <sup>3</sup>	Confidence <sup>4</sup> (H,M,L)	Likely to Exceed A.L?

1

Continuous or intermittent: inhalation; dermal, eye

2

Engineering and Administrative Controls

3

0=trivial; 4=100%OEL or high risk

4

Investigators confidence in exposure risk rating

<b>Comments:</b>	
<b>Recommendations:</b>	
<b>Significant Tasks/Shops for Future Evaluation (Attach Monitoring Plan):</b>	
<b>Analyst, Billet/Position Title:</b>	<b>Date:</b>

Attach any screening measurement results

**PROCESS/TASK-BASED EXPOSURE ASSESSMENT**
**Unit:** Your National Park

**Date:** 20 August 2003

**Shop or Task:** Road Maintenance: Workers operate Case 580, Operate back hoe and ditcher, apply cold patch asphalt paving to repair roadways; clean culverts using vacuum apparatus; do cold road crack sealing; Grade roads; operate sweeper behind tractor. Conduct bridge repair requiring cutting of stone facing material.

Potential Hazard	Std. Or OEL	Exposure Type Route <sub>1</sub>	Frequency/ Duration	Controls <sub>2</sub>	PPE	Exposure Risk Rating <sub>3</sub>	Confidence <sub>4</sub> (H,M,L)
Hydraulic fluid		Dermal, splash eyes	Rare			1	H
Low VOC Cold Patch		Dermal	Infrequent 1/month			1	H
VOC's in "cut back" cold patch:  Kerosene Gasoline Naphtha	100mg/m3 300ppm 300ppm	Inhalation				2	M
Silica	0.05 mg/m3 R	Inhalation	Infrequent			2	L

<sup>1</sup> Continuous or intermittent inhalation; splash; mech. contact, thermal, electrical, chemical, multiple

<sup>2</sup> Engineering and Administrative Controls

<sup>3</sup> 0=trivial; 4=100%OEL or high risk/significant noncompliance

<sup>4</sup> Investigators confidence in exposure risk rating

**Comments:** 1) Roadways are newly surfaced; therefore many tasks are rare or no longer done (such as line painting). 2) Most maintenance engineers rely on “cutback asphalts” (also known as “cold asphalt” or “cold mix”) as a temporary patch until hot asphalt can be applied. These cutback asphalts are made from forms of hot asphalt which have been blended with petroleum solvents or other “cutbacks”, (also called diluents) such as kerosene, gasoline or other naphtha-based products to prevent the asphalt from solidifying prior to application. This process allows the product to be stored, transported or bagged for long periods of time. Once applied, these diluents evaporate and the asphalt begins to harden. One 60 lb. bag of cold asphalt will usually contain between 3-5% (about 1 liter) of these cutbacks. When these liquid cutbacks evaporate, they release large amounts of volatile organic compounds (VOCs) into the atmosphere and provide a potential for overexposure. Use of Low VOC cold patch will greatly limit employee exposure to these compounds. 3) Dermal exposure is the more important route of exposure to Low VOC cold patch and cold crack seal.

**Recommendations:** 1) Use low VOC cold patch. 2) Conduct exposure monitoring to evaluate silica exposure during stone cutting and fitting tasks

**Significant Tasks/Shops for Future Evaluation:**

**Analyst(s), Billet/Position Title(s):** Your Industrial Hygienist

**Date:**

## **4.2 HEARING LOSS PREVENTION**

### **National Park Service Hearing Loss Prevention Policy**

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A Hearing Loss Prevention program shall be implemented to protect NPS employees and volunteer workers from hearing loss when they are exposed to occupational noise at a level at or greater than 85 decibels (A-weighted as an eight-hour, time-weighted average). Precautions will be taken to prevent exposures greater than 90 dbA. Exposures at or above this level are considered hazardous and pose an excessive and unacceptable risk of hearing loss.

Scope: This program applies to all employees and volunteers of the National Park Service who are exposed to hazardous noise in the course of their duties with NPS.

### **References**

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NPS Hearing Loss Prevention programs will meet the requirements of 29 CFR 1910.95, Occupational Noise Exposure and 29 CFR 1904.10 Recording Criteria for Cases Involving Occupational Hearing Loss.

### **Program Elements**

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1. *Identify Noise Hazards.* Area and personal exposure monitoring shall be conducted to identify noise-hazardous equipment and locations and to characterize worker exposure. Periodic follow-up monitoring will be conducted when there is a change in equipment, work processes or maintenance routines, or if workers are developing significant threshold shifts.
2. *Control Noise Hazards.* To the extent feasible, engineering controls, administrative controls and work practices shall be used to ensure that workers are not exposed to noise at or above 90 dBA as an eight-hour time-weighted average (TWA).
3. *Provide and Use Hearing Protectors.* Hearing protectors shall be provided by the park at no cost to employees. Workers shall be required to wear hearing protectors with adequate noise-reduction capabilities when operating equipment or working in areas that expose them to sound levels that equal or exceed 90 dBA as an eight-hour TWA or whenever exposed to impact noise of 140 dBA or greater. It is strongly recommended that workers wear single hearing protectors whenever exposed to noise levels greater than 85 dBA and double hearing protectors whenever exposed to noise greater than 104 dBA, regardless of duration.
4. *Provide Medical Surveillance.* The park shall provide audiometric testing to determine hearing threshold levels for all workers whose exposures equal or exceed 85 dBA as an eight-hour TWA. A baseline audiogram shall be provided before employment or within 30 days of employment for all workers who will be exposed to noise levels at or above 85 dBA. Audiometric tests shall be conducted annually to determine changes in hearing relative to the baseline audiogram.

5. *Communicate Noise Hazards.* All workers who are exposed to noise at or above 85 dBA as an eight-hour TWA shall be informed of their exposure, the associated risk and protective requirements. Warning signs shall be clearly visible at the entrance to, or at the periphery of, areas where noise exposures routinely equal or exceed 85 dBA.
6. *Train Noise Exposed Workers.* The park shall institute a training program, and ensure worker participation, in occupational hearing loss prevention for all workers who are exposed to noise at or above 85 dBA as an eight-hour TWA. The training program shall be repeated annually to provide reinforcement and updated information.
7. *Keep Records.* The park shall establish and maintain records of area noise monitoring, personal exposure monitoring, personnel notifications, personnel training and audiometric evaluations.

### **Hearing Loss Prevention Program Implementation Action Items**

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Step 1 ☐ Identify noise-hazardous areas and equipment in your workplace and post warning signs. (This will require a calibrated sound-level meter or noise dosimeter and operator, labels and placards)

Step 2 ☐ Monitor to determine worker exposures and inform them of the risk. (Exposures may be calculated or modeled based on data collected in Step 1 or determined through personal dose monitoring. Personal monitoring requires a noise dosimeter.)

Step 3 ☐ Take steps to eliminate or control hazards by such measures as isolation, avoidance or changes in work practices noise.

Step 4 ☐ Provide workers with appropriate hearing protectors when engineering and administrative control measures (Step 3) fail to reduce noise exposure to a safe level. Ensure that they know how to use them and that they do use them.

Step 5 ☐ Conduct baseline audiometric testing of exposed workers. Repeat this testing every year they are exposed to detect changes in hearing.

Step 6 ☐ Train exposed workers.

Step 7 ☐ Set up a system to maintain records of area noise monitoring, personal exposure monitoring, personnel notification, personnel training and audiometric evaluations.

## **Technical Appendices**

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Appendix A: Exposure Criteria

Appendix B: Hearing Protectors

Appendix C: Medical Surveillance

Appendix D: Hazard Communication

Appendix E: Training

Appendix F: Record-Keeping

## Appendix A: Exposure Criteria

National Park Service hearing loss prevention programs are based on an occupational exposure limit (OEL) of 90 decibels, A-weighted (dBA), as an eight-hour, time-weighted average (TWA). Exposure to continuous, intermittent or impulse noise shall never exceed 140 dBA. A hearing loss prevention program will be implemented for all employees whose daily exposure is equal to or greater than 85 dBA.

### Allowable Exposure

Occupational noise exposure shall be controlled so that worker exposures are less than the combination of exposure level (L) and duration (T). Exposure is calculated by the following formula, where 5 = the exchange rate and 90 = the OEL, or as shown in Table A1.

$$T(\text{min}) = \frac{480}{2^{(L-90)/5}}$$

Table A1. Allowable exposure duration at given noise levels  IF THE NOISE LEVEL IS...	...THEN WORKERS MAY BE EXPOSED FOR...		IF THE NOISE LEVEL IS...	...THEN WORKERS MAY BE EXPOSED FOR...	
	HOURS	MINUTES		HOURS	MINUTES
85 dBA	16	0	99	2	18
86	13	10	100	2	0
87	12	6	101	1	42
88	10	36	102	1	30
89	9	12	103	1	18
90	8	0	104	1	6
91	7	0	105	1	0
92	6	6	106	0	54
93	5	18	107	0	48
94	4	36	108	0	42
95	4	0	109	0	36
96	3	30	110-115	0	<18
97	3	0	116-130	0	<2
98	2	36	130-140	0	0

### Daily Noise Dose

When the daily noise exposure consists of periods of different noise levels, the daily dose

(D) shall not equal or exceed 100 as calculated according to the following formula:

$$D = [C1/T1 + C2/T2 + \dots + Cn/Tn] \times 100$$

where

Cn = total time of exposure at a specified noise level, and

Tn = exposure duration for which noise at this level becomes hazardous.

The daily dose can be converted into an eight-hour TWA according to the following formula (or as shown in Table 1-2):

$$TWA = 10.0 \times \text{Log}(D/100) + 90$$

### Monitoring

Monitoring of the work site or of noisy work tasks shall be conducted to determine the noise exposure levels representative of all workers whose eight-hour TWA noise exposures may equal or exceed 85 dBA. For workers remaining in essentially stationary, continuous noise levels, either a sound-level meter or a dosimeter may be used. However, for workers who move around frequently or who perform different tasks with intermittent or varying noise levels, a task-based exposure monitoring strategy may provide a more accurate assessment of the extent of exposures.

Noise exposure is to be measured without regard to the wearing of hearing protectors. In determining TWA exposures, all continuous, varying, intermittent and impulsive sound levels from 80 to 130 dBA shall be integrated into the noise measurements. An exchange rate of 5 will be used.

### Instrumentation

Instruments used to measure workers' noise exposures shall conform to the American National Standard Specification for Sound Level Meters, ANSI S1.4-1983 and S1.4A-1985, Type 2 [ANSI 1983, 1985] or, with the exception of the operating range, to the *American National Standard Specification for Personal Noise Dosimeters*, ANSI S1.25-1991 [ANSI 1991a]. Sound-level meters shall be set at SLOW response. Sound-level meters shall be calibrated to ensure measurement accuracy.

## **Appendix B: Hearing Protectors**

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When engineering controls, administrative controls and work practices cannot keep workers' exposures below 90 dBA as an eight-hour TWA, the use of hearing protectors shall be required. Hearing protectors shall attenuate noise sufficiently to keep workers' "realworld" exposure (i.e., the noise exposure at the worker's ear when hearing protectors are worn) below 90 dBA as an eight-hour TWA. Workers whose eight-hour TWA exposures exceed 105 dBA should wear double hearing protection (i.e., they should wear earplugs and earmuffs simultaneously).

In addition, workers shall wear prescribed hearing protection when working with hazardous equipment or in noise-hazardous areas regardless of whether their eight-hour TWA equals or exceeds 90 dBA. It would be prudent for a worker in and out of noise or habitually exposed to loud noise (e.g., 91 dBA for < 2 hours) to wear hearing protection while in noisy environments, even though his or her dose is less than 100%.

### Noise Reduction Rating

To compensate for known differences between laboratory-derived attenuation values and the protection obtained by a worker in the real world, the labeled noise-reduction ratings (NRRs) shall be reduced by seven decibels.

For example, if a worker is exposed to 98 dbA (eight-hour TWA) and is supplied hearing protectors with a 20 dB NRR:

Subtract 7 from the manufacturer's NRR,

$$20 - 7 = 13;$$

Subtract the remainder from the employee's exposure level,

$$98 - 13 = 85;$$

Therefore, the hearing protectors are adequate. However, it must be noted that OSHA and NIOSH recommend a further decrease in NRR.

The park shall train workers at least annually to select and fit hearing protectors.

## **Appendix C: Medical Surveillance**

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The park shall provide audiometry to determine hearing threshold levels for all workers whose exposures equal or exceed 85 dBA as an eight-hour TWA. Audiometric tests shall be conducted annually to determine changes in hearing relative to the baseline audiogram.

### **Audiometric Testing**

Workers shall not be exposed to noise levels at or above 85 dBA for a minimum of 14 hours before receiving a baseline audiometric test. Hearing protectors shall not be used in lieu of the required quiet period.

Audiometric tests shall be conducted during the worker's normal work shift. Audiometric tests shall be performed by a physician, an audiologist or an occupational hearing conservationist certified by the Council for Accreditation in Occupational Hearing Conservation (CAOHC) or the equivalent, working under the supervision of an audiologist or physician.

Audiometric testing shall consist of air-conduction, pure-tone, hearing threshold measures at no less than 500, 1000, 2000, 3000, 4000 and 6000 Hertz (Hz). Right and left ears shall be individually tested. The 8000-Hz threshold should also be tested as an option and as a useful source of information about the etiology of a hearing loss.

Audiometric tests shall be conducted with audiometers that meet the specifications of, and are maintained and used in accordance with, the American National Standard Specifications for Audiometers, ANSI S3.6-1996 [ANSI 1996b]. Audiometers shall receive a daily functional check, an acoustic calibration check whenever the functional check indicates a threshold difference exceeding 10 dB in either earphone at any frequency, and an exhaustive calibration check annually or whenever an acoustic calibration indicates the need—as outlined in Section 5.5.2. The date of the last annual calibration shall be recorded on each worker's audiogram.

Audiometric tests shall be conducted in a room where ambient noise levels conform to all requirements of the American National Standard Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms, ANSI S3.1-1991 [ANSI 1991b]. Instruments used to measure ambient noise shall conform to the American National Standard Specification for Sound Level Meters, ANSI S1.4-1983 and S1.4A-1985, Type 1 [ANSI 1983, 1985] and the American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters, ANSI S1.11-1986 [ANSI 1986]. For permanent on-site testing facilities, ambient noise levels shall be checked at least annually. For mobile testing facilities, ambient noise levels shall be tested daily or each time the facility is moved (whichever is more often). Ambient noise measurements shall be obtained under conditions representing the typical acoustical environment likely to be present when audiometric testing is performed. Ambient noise levels shall be recorded on each audiogram or made otherwise accessible to the professional reviewer of the audiograms.

### Baseline Audiogram

The park shall provide audiometric testing to determine hearing threshold levels for all workers whose exposures equal or exceed 85 dBA as an eight-hour TWA. A baseline audiogram shall be obtained for each worker within six months of his/her initial exposure to noise levels at or above 85 dBA as an eight-hour TWA. Audiometric tests shall be conducted annually to determine changes in hearing relative to the baseline audiogram.

### Annual Monitoring Audiogram

Audiometric tests shall be conducted annually to determine changes in hearing relative to the baseline audiogram. When the monitoring audiogram detects a change in the hearing threshold level in either ear that equals or exceeds an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear, this is referred to as a significant threshold shift.

An optional retest may be conducted immediately to determine whether the significant threshold shift is persistent. The retest will frequently demonstrate that the worker does not have a persistent threshold shift, thereby eliminating the need for a confirmation audiogram and follow-up action. If a persistent threshold shift has occurred, the worker shall be informed that his or her hearing may have worsened and additional hearing tests will be necessary.

### Confirmation Audiogram and Follow-up Action

When a worker's monitoring audiogram detects a significant threshold shift, he or she shall receive a confirmation audiogram within 30 days. This confirmation test shall be conducted under the same conditions as those of a baseline audiometric test. If the confirmation audiogram shows the persistence of a threshold shift, the audiograms and other appropriate records shall be reviewed by an audiologist or physician.

If this review validates the threshold shift, the shift shall be recorded in the worker's medical record and the confirmation audiogram shall serve as the new baseline. This new baseline shall be used to calculate any subsequent significant threshold shift. Whenever possible, the worker should receive immediate feedback on the results of his or her hearing test. However, in no case shall the worker be required to wait more than 30 days.

When a significant threshold shift has been validated, the park shall take appropriate action to protect the worker from additional hearing loss due to occupational noise exposure. Examples of appropriate action include explanation of the effects of hearing loss, re-instruction and refitting of hearing protectors, additional training of the worker in hearing loss prevention and reassignment of the worker to a quieter work area.

When the reviewing audiologist or physician suspects a hearing change is due to a non-occupational etiology, the worker shall receive appropriate counseling, which may include referral to his or her physician.

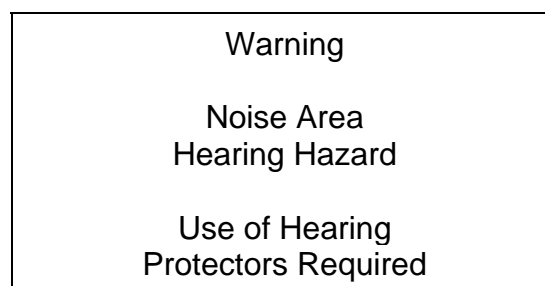
## Appendix D: Hazard Communication

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### Warning signs

Warning signs shall be clearly visible at the entrance to, or at the periphery of, areas where noise exposures routinely equal or exceed 85 dBA and on equipment that produces noise equal to or greater than 85 dBA.

All warning signs shall be in English and, where applicable, in the predominant language of workers who do not read English. Workers unable to read the warning signs shall be informed verbally about the instructions printed on signs in hazardous work areas of the facility. The warning sign shall textually or graphically contain the following information:



**Example 1.** Warning sign with text and graphics **Example 2.** Warning sign with text only

### Worker Notification

All workers who are exposed to noise at or above 85 dBA as an eight-hour TWA shall be informed of their exposure, the associated risk and protective requirements. Workers shall be notified within 30 days when initial noise measurements confirm the presence of hazardous noise or when follow-up noise measurements identify additional noise hazards. New workers shall be alerted about the presence of hazardous noise before they are exposed.

## **Appendix E: Training**

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The park shall institute a training program in occupational hearing loss prevention for all workers who are exposed to noise at or above 85 dBA as an eight-hour TWA and ensure that these workers participate in the training. The training program shall be repeated annually to provide reinforcement and updated information.

The training addresses, at a minimum, the following topics:

1. The physical and psychological effects of noise and hearing loss;
2. Hearing protector selection, fitting, use and care;
3. Audiometric testing; and
4. The roles and responsibilities of parks and workers in preventing noise-induced hearing loss.

The format for the training program may vary from formal meetings to informal on-the-spot presentations. Allowances shall be made for one-on-one training, which would be particularly suitable for workers who have demonstrated a significant threshold shift. Whenever possible, the training should be timed to coincide with feedback on workers' hearing tests.

The park shall maintain a record of educational and training programs for each worker for the duration of employment plus one year. On termination of employment, the employer should provide a copy of the training record to the worker. The employer may wish to keep the training record with the worker's exposure and medical records for longer durations (see Appendix F, Record-Keeping).

## **Appendix F: Record-Keeping**

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The park shall establish and maintain records of area noise monitoring, personal exposure monitoring, personnel training and audiometric evaluations.

### *Exposure Assessment Records*

The park shall establish and maintain an accurate record of all exposure measurements.

### *Medical Surveillance Records*

The park will establish and maintain audiometric test records for each worker subject to the medical surveillance. This should include tester identification, conditions of the test, the etiology of any significant threshold shift and the identification of the reviewer.

### Training Records

The park shall maintain a record of educational and training programs for each worker. On termination of employment, the employer should provide a copy of the training record to the worker.

### Record Retention

In accordance with the requirements of 29 CFR 1910.95 Hearing Conservation, the park shall retain records for at least the following periods:

- Two years for noise-exposure monitoring records.
- Duration of employment for medical monitoring records.
- Duration of employment plus one year for training records.

## 4.3 RESPIRATORY PROTECTION

### National Park Service Respiratory Protection Policy

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Parks will assess respiratory hazards in the workplace. Engineering controls, such as enclosure of the operation, general and local exhaust ventilation and substitution of less toxic materials, will be implemented to the extent feasible to control airborne exposure to harmful dusts, fogs, fumes, mists, gases, smokes, sprays or vapors. When engineering controls are not feasible, appropriate respirators shall be used in compliance with 29 CFR 1910.134, Respiratory Protection and this guidance.

Scope: This program applies to all employees and volunteers of the National Park Service who use respirators in the course of their duties.

#### References

1. 29 CFR 1910.134, Respiratory Protection.
2. 29 CFR 1910, Subpart Z. Toxic and Hazardous Substances.
3. 29 CFR 1910 and 1926, Agent-specific regulations.
4. 29 CFR 1910.1020, Access to Employee Exposure and Medical Records.
5. NIOSH. 1987, *Respirator Decision Logic*. DHHS (NIOSH) Publication No. 87-108.
6. ACGIH. 2003, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

#### Program Elements

1. *Program Administration*. A Respiratory Protection Program Administrator (RPPA) shall be designated to administer, oversee and evaluate the effectiveness of the respiratory protection program. The RPPA must be qualified by training and experience to carry out these duties and responsibilities.
2. *Exposure Assessment*. The park shall assess exposures in the workplace (by way of personnel air sampling, mathematical modeling or some other objective means) to determine what hazardous exposures exist, what exposure levels are, the existence of atmospheres that are immediately dangerous to life and health (IDLH), and to determine the necessary level of respiratory protection. Hazardous exposures are those determined to be greater than OSHA-permissible exposure limits (PEL) or the Threshold Limit Values (TLV) of the American Conference of Governmental Industrial Hygienists (ACGIH) for work-shift and short-term exposures.

3. *Engineering and Administrative Controls.* Parks shall implement engineering and administrative controls, including enclosure of the operation, general and local exhaust ventilation, work practice controls and substitution of less-toxic materials to control airborne exposure to harmful dusts, fogs, fumes, mists, gases, smokes, sprays or vapors. Engineering and administrative controls will be evaluated and implemented to the extent feasible before respirators are used to control personal exposures.
4. *Written Respiratory Protection Program.* Parks shall develop and implement a written respiratory protection program including park and work-site-specific procedures for protecting workers from hazardous inhalation exposures.
5. *Respirator Selection.* All respirators shall be NIOSH-certified and must be appropriate for the chemical state and physical form of the hazard. They must also operate within NIOSH-assigned protection factors and maximum-use concentrations limitations.
6. *Medical Evaluation.* Parks shall provide a medical evaluation to determine the employee's ability to use a respirator before the employee is fit-tested or required to use a respirator in the workplace. The evaluation will be conducted by a physician or other healthcare professional licensed to provide such services. A medical evaluation will be completed as described in Appendix D. It will, at a minimum, consist of the completion and evaluation of a medical questionnaire and any other tests required by the physician or other licensed healthcare professional (PLHCP) in order to arrive at an opinion regarding the employee's ability to wear a respirator.
7. *Respirator Fit-Testing.* Tests shall be conducted to ensure the effective fit of all tight-fitting facepiece respirators.
8. *Employee Training.* Parks shall provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable and recur annually (or more often if necessary) to ensure safe use.
9. *Safe Use of Respirators.* Parks shall establish and implement procedures for the proper care and use of respirators, including the following:
  - Cleaning, maintenance and storage of respirators
  - Routine and scheduled inspection
  - User seal checks
  - A cartridge and canister change schedule
  - Limitation of use in IDLH atmospheres
  - Breathing air quality for supplied air respirators
  - Emergency uses

10. *Voluntary Respirator Use.* Conditions and procedures for voluntary use of respirators under non-hazardous conditions should be established. This is to ensure that employees are informed about the limitations of respirators and that their use does not present a hazard.
11. *Record-Keeping.* The park shall establish and maintain records of exposure evaluations, personal exposure monitoring, personnel training and written information regarding medical evaluations and fit-testing.
12. *Program Evaluation.* The program shall be reviewed at least annually and be updated as necessary to reflect those changes in workplace conditions that affect respirator use.

### **Respiratory Protection Prevention Program Implementation Action Items**

- Step 1 ☐ *Designate a Respiratory Protection Program Administrator.* (The Respiratory Protection Program Administrator should be provided training sufficient to understand and carry out the requirements of the Respiratory Protection Program.)
- Step 2 ☐ *Assess Exposures, Conduct Exposure Monitoring.* (Respirator selection is based on the type and severity of hazards. For some substances such as lead, asbestos, benzene, formaldehyde and others, specific exposure monitoring methods are required by OSHA. For other hazards, exposure assessment may be conducted using objective data, mathematical modeling or personal exposure monitoring.) Table 1. Occupational Exposure Assessment.
- Step 3 ☐ *Implement Engineering and Administrative Controls to Eliminate or Reduce Exposure to Employees.* (Such controls may include eliminating the hazard by substituting less hazardous chemicals, installing and properly maintaining general dilution ventilation or local exhaust ventilation systems, and defining work practices. Frequently, a combination of methods will be necessary to protect the worker.)
- Step 4 ☐ *Prepare a Written Respiratory Protection Program.* (Follow the example provided in Appendix A, Written Respiratory Protection Program).
- Step 5 ☐ *Select Appropriate Respirators.* (Each respirator type has limitations in the protection it can provide. Guidance for appropriate selection of respirators is found in Appendix B, Respirator Selection Guide.)

- Step 6 ☐ *Establish Policy and Procedures to Follow to Ensure Safe Use.* (Employees must know how to: wear their respirators; conduct user seal checks, clean, maintain and store them; change cartridges and appropriate schedules; inspect equipment and air quality). See Appendix E, Safe Use of Respirators, and Appendix F, Determining Cartridge and Canister Change-Out Schedules.
- Step 7 ☐ *Provide Medical Evaluation for Respirator Wearers.* (Medical evaluations must be completed before the worker is fit-tested and allowed to wear a respirator.) See Appendix C, Medical Evaluation.
- Step 8 ☐ *Conduct Respirator Fit-Testing.* (All tight-fitting respirators that rely on a face-to-respirator seal to provide protection must be properly fitted to the worker. Fit tests may be qualitative or quantitative; however, some respirators and some uses will require quantitative fit-testing. Guidance is provided in Appendix D.)
- Step 9 ☐ *Train Employees.* See Appendix G, Employee Training.
- Step 10 ☐ *Establish Conditions for Voluntary Use of Respirators.* (Requires an evaluation of proposed uses. Provide information to employees. See Appendix H.)
- Step 11 ☐ *Set up a system to maintain records of exposure evaluations, personal exposure monitoring, personnel training and written information regarding medical evaluations and fit-testing.* See Appendix I.
- Step 12 ☐ *Evaluate Program Effectiveness Annually and Update as Necessary.*

## **Technical Appendices**

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Appendix A: Written Respiratory Protection Program

Appendix B: Respirator Selection Guide

Appendix C: Medical Evaluation

Appendix D: Respirator Fit-testing

Appendix E: Safe Use of Respirators

Appendix F: Determining Cartridge and Canister Change-Out Schedules

Appendix G: Employee Training

Appendix H: Voluntary Respirator Use

Appendix I: Record-Keeping

## **Appendix A. Written Respiratory Protection Program**

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### **Written Program Requirements**

Each Park shall develop and implement a written respiratory protection program with work-site-specific procedures and requirements for respirator use. The program must address the following elements:

1. Program administration and designation of program administrator.
2. Procedures for selecting respirators for use in the workplace.
3. Medical evaluations of employees required to use respirators.
4. Fit-testing procedures for tight-fitting respirators.
5. Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.
6. Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and otherwise maintaining respirators.
7. Procedures to ensure adequate air quality, quantity and flow of breathing air for atmosphere-supplying respirators.
8. Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations (see also hazard communication).
9. Conditions for voluntary use where no hazards exist.
10. Training of employees in the proper use of respirators (including placement and removal, any limitations on their use and their maintenance).
11. Procedures for regularly evaluating the effectiveness of the program.

## Sample Written Respiratory Protection Program

### **Respiratory Protection Program Your National Park**

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*Policy:* Your National Park employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. The park will provide this needed information through implementation of a Hazard Communication Program.

*Scope:* This program applies to all respiratory hazards and respirator use by park employees and volunteers. Contractors working in or for the park are responsible for providing their own respiratory protection programs and respiratory protective equipment meeting OSHA requirements.

*Reference/Authority:* RM 50B National Park Service Occupational Safety and Health Program requires parks to provide volunteers and employees protection from harmful substances in the workplace; 29 CFR 1910.160 Basic Program Elements for Federal Employee Occupational Safety and Health Programs prescribes federal agency responsibility for adherence to occupational safety and health standards promulgated under OSHA; 29 CFR 1910.134 Respiratory Protection prescribes minimum requirements for respiratory protection programs and respirator use.

#### Respiratory Protection Program Administrator (RPPA)

John Brown, Safety Manager is designated the RPPA for your park. Jane Williams, Maintenance Division, and Bill Sanders, Ranger Activities, will assist the RPPA and coordinate respiratory protection activities for their divisions.

#### Responsibilities

The Respiratory Protection Program Administrator is responsible for evaluating those tasks for which respiratory protection is thought to be necessary, determining the degree of hazard posed by the potential exposure, determining whether engineering or administrative controls are feasible, and specifying which respiratory protection device is to be used at each task. In addition, the RPPA will provide for training of workers in the selection and use of respiratory protective devices, medical evaluation, and qualitative and quantitative fit-testing, and issue necessary protective devices. The RPPA will review the adequacy of this plan and update it annually.

Supervisors will ensure each employee under his or her supervision using a respirator has received appropriate training in its use and an annual medical evaluation. Supervisors will ensure the availability of appropriate respirators and accessories, provide adequate storage facilities and encourage proper respirator equipment maintenance. Supervisors must be aware of tasks requiring the use of respiratory

protection and ensure all employees engaged in such work use the appropriate respirators at all times.

It is the responsibility of each respirator wearer to wear his or her respirator when and where required and in the manner in which he or she was trained. Respirator wearers must report any malfunctions of the respirator to their supervisors immediately. The respirator wearer must also guard against mechanical damage to the respirator, clean the respirator as instructed and store the respirator in a clean, sanitary location.

### Exposure Assessment

The park shall assess exposures in the workplace (by way of personnel air sampling, mathematical modeling or some other objective means) to determine what hazardous exposures exist, what exposures levels are, the existence of immediately dangerous to life and health (IDLH) atmospheres, and the necessary level of respiratory protection. Hazardous exposures are those determined to be greater than OSHA-permissible exposure limits (PEL) or the Threshold Limit Values (TLV) of the American Conference of Governmental Industrial Hygienists (ACGIH) for work-shift and short-term exposures.

### Engineering Controls

Parks shall implement engineering and administrative controls, including enclosure of the operation, general and local exhaust ventilation, work practice controls and substitution of less-toxic materials to control airborne exposure to harmful dusts, fogs, fumes, mists, gases, smokes, sprays or vapors. Engineering and administrative controls will be evaluated and implemented to the extent feasible before respirators are used to control personal exposures.

Supervisors will ensure the daily maintenance and function of ventilation systems used to control respiratory hazards in their shops. Ventilation systems will be evaluated at least annually to validate flow rates and capture velocities.

### Respirator Selection

All respirators shall be NIOSH-certified and must be appropriate for the chemical state and physical form of the hazard, and within NIOSH-assigned protection factors and maximum-use concentration limitations.

Respiratory hazards have been evaluated at your park to determine proper selection of respirators. Specific respirator requirements for park operations are given in Table 1. Your Park Respirator Selection Guide. For operations that have not been evaluated, or when ambient conditions, materials, processes and controls are different from those described in the Guide, the RPPA will be advised and consulted for a determination of appropriate respirator.

**Table 1. Your Park Respirator Selection Guide**

Operation	Location	Engineering Controls in Place	Hazardous Agent	Type of Respirator	Criterion	Cartridge Change-out	
						Schedule	Method
Brake shoe removal using enclosed cylinder vacuum system	Auto maint. shop	Enclosed cylinder vacuum system	Asbestos	Half-face with N100 filter; or N100 Filtering facepiece	0.1 f/cc	Every 12 brake jobs	NA
Welding in confined spaces (low-toxicity metals and galvanized)	Confined spaces	Forced air ventilation	Iron fume, zinc oxide fume	N95	5 mg/m <sub>3</sub> iron, 5 mg/m <sub>3</sub> zinc	Every month (<50 mg/m <sub>3</sub> )	NA
Painting, brush application, latex paints	Outside	Good natural ventilation		Not required		NA	NA
Painting, brush application, solvent based, low-toxicity paints	Indoors	Natural ventilation	Toluene, xylene	Not required	50 ppm toluene, 100 ppm xylene	Every 12 hours (<500 ppm, <50 % rH)	OSHA Wood Model Table
Painting, spray application, 2-part polyurethane	Spray booth	Spray booth Laminar flow exhaust ventilation	TDI, MDI	Full-face supplied air, pressure demand tight-fitting facepiece	0.005 ppm	NA	NA
Painter's assistant, mix isocyanate paints, clean equipment	Spray booth and mix station, no painting	Spray booth, side draft exhaust at mix station	TDI, MDI, MEK	Full-face supplied air, with MSA GMA organic vapor cartridge	0.005 ppm TDI, 0.005 ppm MDI, 200 ppm MEK	Every 4 hours (<600 ppm, <60% rH)	Manufacturer's data
Wood working, cutting, sanding (beech, with red cedar, oak)	Wood shop	Local exhaust ventilation	Wood dust	Half-face with N95 or filtering facepiece	1-5 mg/m <sub>3</sub>	Every month	NA
Removing rodent nests, cleaning rodent infestation, handling trapped rodents	Indoors	Natural ventilation	Communicable disease agents, hantavirus	Full-face or filtering facepiece	NA	N95	NA

### Medical Evaluation

All workers required to wear respirators will be provided a medical evaluation before they are fit-tested or permitted to wear a respirator. Evaluations will be conducted by the Bugtussle Occupational Health Clinic.

Supervisors will coordinate with the RPPA for medical evaluation and provide the following:

1. The type and weight of the respirator to be used by the employee.
2. The duration and frequency of respirator use.
3. The expected physical work effort.
4. Additional protective clothing and equipment to be worn.
5. Temperature and humidity extremes that may be encountered.

Workers will complete the OSHA questionnaire and bring it with them to the Occupational Health Clinic. Test will be conducted by the clinic as needed to determine the ability of the worker to use the respirator.

*Fit-testing:* All tight-fitting respirators will be fitted. Fit-testing will be conducted before workers are required to wear their respirators. Medical evaluations must be completed before fit-testing. The following people have been trained to conduct qualitative fit tests using the Bitrex or irritant smoke methods:

John Brown, Safety Manager  
Jane Williams, Maintenance Division

Supervisors will coordinate fit-testing with these individuals.

### Maintenance, Care and Storage of Respirators

Section supervisors will ensure that workers properly care for and maintain their respirators.

*Cleaning.* Respirators will be cleaned after each use according to the following procedures:

1. Remove filters, cartridges or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses or any components recommended by the manufacturer. Discard or repair any defective parts.

2. Wash components in warm (110°F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle brush may be used to facilitate the removal of dirt.
3. Rinse components thoroughly in clean, warm (110°F maximum), preferably running water. Drain.
4. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in hypochlorite solution (50 ppm of chlorine) made by adding approximately 1 milliliter of laundry bleach to 1 liter of water at 110°F, or other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
5. Rinse components thoroughly in clean, warm (110°F maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Components should be hand-dried with a clean lint-free cloth or air-dried.
7. Reassemble facepiece, replacing filters, cartridges and canisters where necessary.
8. Test the respirator to ensure that all components work properly.

*Storage.* Respirators will be stored in Ziploc-type bags in lockers or designated storage containers.

*Inspection.* Respirators must be inspected before each use. Check respirator function, tightness of connections and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube and cartridges, canisters or filters. Check elastomeric parts for pliability and signs of deterioration.

*Repairs.* When respirators are damaged or fail inspection they must be repaired or discarded and replaced. Only the manufacturer's NIOSH-approved replacement parts designed for the respirator will be used. Repairs of air-supplied respirator regulators will be made only by a factory.

#### User Seal Checks

Both positive and negative user facepiece seal checks shall be performed by the wearer of tight-fitting respirators to ensure that an adequate seal is achieved each time the respirator is put on.

### Breathing Air Quality

On a quarterly basis, the supervisor of the Paint Shop will collect and submit a breathing air sample to AirData Laboratories for air-quality analysis. Breathing air will meet Grade D requirements. The compressor's CO alarm will be checked monthly. Sorbent beds and filters will be replaced every six months.

### Employee Training

The RPPA will provide training for all respirator wearers in the following program elements: The park's written respiratory protection program; proper use and limitations of respirators; individual responsibilities; correct respirator selection and use; and hands-on activity to ensure proper fit, user seal check procedures, inspection, cleaning, maintenance and storage of the respirator. The RPPA will provide an opportunity to become familiar with respirator use for an extended period of time in normal air. Training will be completed prior to respirator use and will be repeated at least annually. A written record of the training will be maintained by the RPPA.

### Voluntary Use of Respirators

Employees may desire to wear respirator protection for reasons of personal comfort or preference in the absence of respiratory hazards in the workplace that would require the use of a respirator. With the approval of the Respiratory Protection Program Administrator (RPPA), employees may elect to utilize filtering facepiece respirators (dust masks) under the following conditions:

- a. Voluntary use of respirators will be limited to filtering facepieces.
- b. RPPA approval is obtained after an evaluation has determined that use of the respirator will not in itself create a hazard.
- c. Voluntary users of respirators will be provided a copy of 29CFR1910.134, Appendix D, "Information for Employees Using Respirators When Not Required Under the Standard").
- d. If filtering facepiece respirators are provided by the park they will be NIOSH approved.

### Record-Keeping

Training, medical evaluation and exposure assessment records will be provided by the RPPA and maintained by the Personnel Department. Copies of these records will also be maintained by the RPPA for ready reference and tracking of employees currently using respirators.

Records of cartridge change-out determinations will be maintained by the RPPA for as long as the cartridge is in service.

### Program Evaluation

The RPPA will lead division supervisors in a critical review of this program annually to determine its effectiveness in addressing respiratory hazards at the park and make appropriate modifications.

Approved:

\_\_\_\_\_  
Superintendent

\_\_\_\_\_  
Date

## Appendix B. Respirator Selection Guide

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Selection of the proper respirators is made only after a determination of the potential contaminant and concentrations has been made. Selection of respirators will be made by the RPPA and may require consultation with a qualified Industrial Hygienist. All respirators will be NIOSH-approved, and selection will be consistent with NIOSH Respirator Decision Logic.<sup>1</sup> Factors that must be taken into account are:

- Effectiveness of the device against the substance of concern.
- Estimated maximum concentration of the substance in the work area.
- General environment (open shop or confined space, etc.).
- Known limitations of the respiratory protective device.
- Comfort, fit and worker acceptance.
- Other contaminants in the environment or potential for oxygen deficiency.

Supervisors shall contact the RPPA prior to non-routine work which may expose workers to hazardous substances or oxygen-deficient atmospheres.

### Types of Respirators

#### Air-Purifying Respirator

These respirators remove air contaminants by filtering, absorbing, adsorbing or chemically reacting with the contaminants as they pass through the respirator canister or cartridge. This respirator is to be used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

- Particulate-removing respirators, which filter out dusts, fibers, fumes and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters. **NOTE: Surgical masks do not provide protection against air contaminants. They are never to be used in place of an air-purifying respirator. They are for medical use only.**
- Gas- and vapor-removing respirators, which remove specific individual contaminants or a combination of contaminants by absorption, adsorption or by chemical reaction. Gas masks and chemical-cartridge respirators are examples of gas- and vapor-removing respirators.
- Combination particulate/gas- and vapor-removing respirators, which combine the respirator characteristics of both kinds of air-purifying respirators.

1. NIOSH. 1987. *Respirator Decision Logic*. DHHS (NIOSH) Publication No. 87-108

### Supplied-Air Respirators

These respirators provide breathing air independent of the environment. Such respirators are to be used when the contaminant has insufficient odor, taste or irritating warning properties, or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Supplied-air respirators, also called air-line respirators, are classified as follows:

- **Demand.** This respirator supplies air to the user on demand (inhalation) which creates a negative pressure within the facepiece. Leakage into the facepiece may occur if there is a poor seal between the respirator and the user's face.
- **Pressure-Demand.** This respirator maintains a continuous positive pressure within the facepiece, thus preventing leakage into the facepiece.
- **Continuous Flow.** This respirator maintains a continuous flow of air through the facepiece and prevents leakage into the facepiece.

### Self-Contained Breathing Apparatus (SCBA)

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection, but it is also the most complex. Training and practice in its use and maintenance are essential. This type of device will be used in emergency situations only.

### Identification of Respirator Cartridges and Gas Mask Canisters

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants. They are specifically labeled and color-coded to indicate the type and nature of protection they provide.

## Appendix C. Medical Evaluation

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Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. In order to determine the employee's ability to use a respirator and to ensure that use of respirators does not result in undue risk to wearer, the following medical evaluation procedures will be followed. Medical evaluations will be performed before an employee is fit-tested or required to use the respirator in the workplace.

Procedures are presented in detail in Appendix C of 29 CFR 1910.134. The process is summarized here.

1. Employees complete a medical questionnaire which is then reviewed by a physician or other licensed healthcare professional (PLHCP). The questionnaire can be found attached to this appendix.
2. The PLHCP must be provided the following information:
  - a. The type and weight of the respirator to be used by the employee.
  - b. The duration and frequency of respirator use (including use for rescue and escape).
  - c. The expected physical work effort.
  - d. Additional protective clothing and equipment to be worn.
  - e. Temperature and humidity extremes that may be encountered.
  - f. A copy of the written respiratory protection program and 29 CFR 1910.134 (e) Medical Evaluation.
3. Following the review of the medical questionnaire, further medical examination must be provided under the following circumstances:
  - a. When an employee gives a positive response to any question among questions 1 through 8 in Section 2 of the medical questionnaire.
  - b. When the initial medical examination demonstrates the need for a follow-up medical examination.

- c. When the follow-up medical examination shall include any medical tests, consultations or diagnostic procedures that the PLHCP deems necessary to make a final determination.

Evaluations will be discontinued when employee is no longer required to use a respirator.

4. The PLHCP will provide a written opinion of the employee's ability to use a respirator. The written opinion will include the following:

- a. A determination of the employee's ability to use the respirator.
- b. Limitations on the use of the respirator.
- c. Need for follow-up evaluations.
- d. A statement that the PLHCP has provided the employee with a copy of the determination.

5. Additional medical evaluations will be provided when any of the following occur:

- a. An employee reports medical signs or symptoms that are related to ability to use a respirator.
- b. A PLHCP, supervisor or the respirator program administrator informs the employer that an employee needs to be re-evaluated.
- c. Information from the respiratory protection program, including observations made during fit-testing and program evaluation, indicates a need for employee re-evaluation.
- d. A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

6. If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, the employer shall provide a powered air-purifying respirator (PAPR) if the PLHCP's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employer is no longer required to provide a PAPR.

## Required OSHA Respirator Medical Evaluation Questionnaire

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To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read? (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the healthcare professional who will review it.

**Part A. Section 1.** (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: \_\_\_\_\_
2. Your name: \_\_\_\_\_
3. Your age (to nearest year): \_\_\_\_\_
4. Sex (circle one): Male/Female
5. Your height: \_\_\_\_\_ ft. \_\_\_\_\_ in.
6. Your weight: \_\_\_\_\_ lbs.
7. Your job title: \_\_\_\_\_
8. A phone number where you can be reached by the healthcare professional who reviews this questionnaire (include the area code): \_\_\_\_\_
9. The best time to phone you at this number: \_\_\_\_\_
10. Has your employer told you how to contact the healthcare professional who will review this questionnaire? (circle one): Yes/No
11. Check the type of respirator you will use (you can check more than one category):
  - a. \_\_\_\_\_ N, R or P disposable respirator (filter-mask, non-cartridge type only).
  - b. \_\_\_\_\_ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator? (circle one): Yes/No

If "yes," what  
type(s): \_\_\_\_\_

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**Part A. Section 2.** (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you **currently** smoke tobacco, or have you smoked tobacco in the last month?  
Yes/No

2. Have you **ever had** any of the following conditions?

- a. Seizures (fits): Yes/No
- b. Diabetes (sugar disease): Yes/No
- c. Allergic reactions that interfere with your breathing: Yes/No
- d. Claustrophobia (fear of closed-in places): Yes/No
- e. Trouble smelling odors: Yes/No

3. Have you **ever had** any of the following pulmonary or lung problems?

- a. Asbestosis: Yes/No
- b. Asthma: Yes/No
- c. Chronic bronchitis: Yes/No
- d. Emphysema: Yes/No
- e. Pneumonia: Yes/No
- f. Tuberculosis: Yes/No
- g. Silicosis: Yes/No
- h. Pneumothorax (collapsed lung): Yes/No
- i. Lung cancer: Yes/No
- j. Broken ribs: Yes/No
- k. Any chest injuries or surgeries: Yes/No
- l. Any other lung problem that you've been told about: Yes/No

4. Do you **currently** have any of the following symptoms of pulmonary or lung illness?

- a. Shortness of breath: Yes/No
- b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
- c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
- d. Have to stop for breath when walking at your own pace on level ground: Yes/No
- e. Shortness of breath when washing or dressing yourself: Yes/No

- i. Shortness of breath that interferes with your job: Yes/No
  - j. Coughing that produces phlegm (thick sputum): Yes/No
  - k. Coughing that wakes you early in the morning: Yes/No
  - l. Coughing that occurs mostly when you are lying down: Yes/No
  - m. Coughing up blood in the last month: Yes/No
  - n. Wheezing: Yes/No
  - o. Wheezing that interferes with your job: Yes/No
  - p. m.Chest pain when you breathe deeply: Yes/No
  - q. Any other symptoms that you think may be related to lung problems: Yes/No
5. Have you **ever had** any of the following cardiovascular or heart problems?
- a. Heart attack: Yes/No
  - b. Stroke: Yes/No
  - c. Angina: Yes/No
  - d. Heart failure: Yes/No
  - e. Swelling in your legs or feet (not caused by walking): Yes/No
  - f. Heart arrhythmia (heart beating irregularly): Yes/No
  - g. High blood pressure: Yes/No
  - h. Any other heart problem that you've been told about: Yes/No
6. Have you **ever had** any of the following cardiovascular or heart symptoms?
- a. Frequent pain or tightness in your chest: Yes/No
  - b. Pain or tightness in your chest during physical activity: Yes/No
  - c. Pain or tightness in your chest that interferes with your job: Yes/No
  - d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
  - e. Heartburn or indigestion that is not related to eating: Yes/ No
  - f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No
7. Do you **currently** take medication for any of the following problems?
- a. Breathing or lung problems: Yes/No
  - b. Heart trouble: Yes/No
  - c. Blood pressure: Yes/No
  - d. Seizures (fits): Yes/No
8. If you've used a respirator, have you **ever had** any of the following problems? (If you've never used a respirator, check the following space and go to question 9.)
- a. Eye irritation: Yes/No
  - b. Skin allergies or rashes: Yes/No
  - c. Anxiety: Yes/No

- d. General weakness or fatigue: Yes/No
- e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the healthcare professional who will review this questionnaire about your answers to this questionnaire? Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you **ever lost** vision in either eye (temporarily or permanently)? Yes/No

11. Do you **currently** have any of the following vision problems?

- a. Wear contact lenses: Yes/No
- b. Wear glasses: Yes/No
- c. Color blind: Yes/No
- d. Any other eye or vision problem: Yes/No

12. Have you **ever had** an injury to your ears, including a broken eardrum? Yes/No

13. Do you **currently** have any of the following hearing problems?

- a. Difficulty hearing: Yes/No
- b. Wear a hearing aid: Yes/No
- c. Any other hearing or ear problem: Yes/No

14. Have you **ever had** a back injury? Yes/No

15. Do you **currently** have any of the following musculoskeletal problems?

- a. Weakness in any of your arms, hands, legs or feet: Yes/No
- b. Back pain: Yes/No
- c. Difficulty fully moving your arms and legs: Yes/No
- d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
- e. Difficulty fully moving your head up or down: Yes/No
- f. Difficulty fully moving your head side to side: Yes/No
- g. Difficulty bending at your knees: Yes/No
- h. Difficulty squatting to the ground: Yes/No
- i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
- j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

## OSHA Questionnaire, Part B

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Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the healthcare professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower-than-normal amounts of oxygen? Yes/No

If “yes,” do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you’re working under these conditions: Yes/No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals? Yes/No

If “yes,” name the chemicals if you know them: \_\_\_\_\_  
\_\_\_\_\_

3. Have you ever worked with any of the materials, or under any of the conditions, listed below?

- a. Asbestos: Yes/No
- b. Silica (e.g., in sandblasting): Yes/No
- c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
- d. Beryllium: Yes/No
- e. Aluminum: Yes/No
- f. Coal (for example, mining): Yes/No
- g. Iron: Yes/No
- h. Tin: Yes/No
- i. Dusty environments: Yes/No
- j. Any other hazardous exposures: Yes/No

If “yes,” describe these exposures: \_\_\_\_\_  
\_\_\_\_\_

4. List any second jobs or side businesses you have: \_\_\_\_\_  
\_\_\_\_\_

5. List your previous occupations: \_\_\_\_\_  
\_\_\_\_\_

6. List your current and previous hobbies: \_\_\_\_\_  
\_\_\_\_\_

7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a HAZMAT team? Yes/No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No

If "yes," name the medications if you know them: \_\_\_\_\_

10. Will you be using any of the following items with your respirator(s)?

- a. a HEPA filters: Yes/No
- b. Canisters (for example, gas masks): Yes/No
- c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

- a. Escape only (no rescue): Yes/No
- b. Emergency rescue only: Yes/No
- c. Less than 5 hours per week: Yes/No
- d. Less than 2 hours per day: Yes/No
- e. 2 to 4 hours per day: Yes/No
- f. Over 4 hours per day: Yes/No

12. During the period you are using the respirator(s), is your work effort:

- a. **Light** (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

Examples of a light work effort are sitting while writing, typing, drafting or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.

- b. **Moderate** (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

Examples of moderate work effort are **sitting** while nailing or filing; **driving** a truck or bus in urban traffic; **standing** while drilling, nailing, performing assembly work or transferring a moderate load (about 35 lbs.) at trunk level; **walking** on a level surface about 2 mph or down a 5-degree grade about 3 mph; or **pushing** a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. **Heavy** (above 350 kcal per hour): Yes/No

If “yes,” how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you’re using your respirator? Yes/No

If “yes,” describe this protective clothing and/or equipment: \_\_\_\_\_  
\_\_\_\_\_

14. Will you be working under hot conditions (temperature exceeding 77°F)? Yes/No

15. Will you be working under humid conditions? Yes/No

16. Describe the work you’ll be doing while you’re using your respirator(s):

\_\_\_\_\_  
\_\_\_\_\_

17. Describe any special or hazardous conditions you might encounter when you’re using your respirator(s) (for example, confined spaces, life-threatening gases):

\_\_\_\_\_  
\_\_\_\_\_

18. Provide the following information, if you know it, for each toxic substance that you’ll be exposed to when you’re using your respirator(s):

Name of the first toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift: \_\_\_\_\_

Name of the second toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift: \_\_\_\_\_

Name of the third toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift: \_\_\_\_\_

The name of any other toxic substances that you'll be exposed to  
while using your respirator:

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19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (e.g., rescue, security):

## Appendix D. Respirator Fit-Testing

Before an employee is required to use any respirator with a tight-fitting facepiece, the employee will be fit-tested to ensure proper facepiece seal. Fit tests will be conducted as follows:

### Fit-Testing Protocols

Fit tests will be conducted using one of several fit test protocols that are recognized by OSHA. Fit-test methods fall into two major types—qualitative (QLFT) and quantitative (QNFT). In qualitative methods, a challenge agent is used to determine whether or not the seal leaks. If there is a leak in the seal, the challenge agent elicits a response in the wearer. Response is dependent on the sensitivity of the wearer and his cooperation. Quantitative methods can not determine how great the leak is. Quantitative methods use instrumentation to determine the relative concentrations inside and outside the facepiece. Complete protocols are presented in Appendix A of 29 CFR 1910.134.

**Table D-1 Acceptable Fit-Testing Methods**

	ASSIGNED PROTECTION FACTORS*	QLFT	QNFT
Half-facepiece Negative Pressure APR	10	Yes	Yes
Full-facepiece Negative Pressure APR, used up to 10 times the PEL or TLV (fit factor of 100 required)	10	Yes	Yes
Full-facepiece Negative Pressure APR, used up to 50 times the PEL or TLV (fit factor of 500 required)	50	No	Yes
Powered Air-Purifying Respirators (PAPR) with tight-fitting facepiece**	50	Yes	Yes
Supplied-Air Respirator, or SCBA with tight-fitting facepiece used in Negative Pressure	10	Yes	Yes
Supplied-Air Respirator, or SCBA with tight-fitting facepiece used in Continuous Flow mode	50	Yes	Yes
Supplied-Air Respirator, or SCBA used in Pressure Demand Mode	10,000	Yes	Yes
SCBA Structural Firefighting, Pressure Demand Mode	10,000	Yes	Yes
SCBA or SAR-IDLH, Pressure Demand Mode	10,000	Yes	Yes
Any loose-fitting respirators, hoods and helmets	25	Fit-testing not required	

\*Based on NIOSH Respirator Decision Logic

\*\*Fit-testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit-testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

### Retesting

Retesting is required when any of the following conditions occur:

- Annually.
- Whenever a different respirator facepiece (size, style, model or make) is used.
- When the employer, PLHCP, supervisor or program administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery or an obvious change in body weight.
- Whenever the employee reports that the fit of the respirator is unacceptable.

### Fit-Tester Qualifications

Fit testing may be conducted by any individual who has received training and has demonstrated competency in the methods to be used.

### Records

Records of all fit tests will be retained for all respirator users until the next fit test is administered. Records must include the name of the employee; type of fit test; specific make, model, style and size of respirator tested; date of the test; and test results.

## **Appendix E. Safe Use of Respirators**

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The following guidelines should be followed to ensure that respirators are kept clean, sanitary and in good working order. Always refer to manufacturer's recommendations for maintenance and storage.

### **Cleaning Respirators**

1. Remove filters, cartridges or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses or any components recommended by the manufacturer. Discard or repair any defective parts.
2. Wash components in warm (110°F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle brush may be used to facilitate the removal of dirt.
3. Rinse components thoroughly in clean, warm (110°F maximum), preferably running water. Drain.
4. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in hypochlorite solution (50 ppm of chlorine) made by adding approximately 1 milliliter of laundry bleach to 1 liter of water at 110°F. Other commercially available cleansers of equivalent disinfectant quality may also be used as directed, if their use is recommended or approved by the respirator manufacturer.
5. Rinse components thoroughly in clean, warm (110°F maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Components should be air-dried or hand-dried with a clean lint-free cloth.
7. Reassemble facepiece, replacing filters, cartridges and canisters where necessary.
8. Test the respirator to ensure that all components work properly.

### Storage

Store respirators so that the facepiece sealing surfaces and valves are protected from damage, deformation and contamination. Emergency respirators must be kept accessible to the work area, stored covered and clearly marked as a respirator for emergency use.

### Inspection

Respirators must be inspected as follows:

- Prior to use and during cleaning.
- Monthly if for emergency use. In addition, functions must be checked before and after each use.
- Before carrying into the workplace, if for emergency escape only.

Inspections will include the following:

- A check of respirator function, tightness of connections and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters.
- A check of elastomeric parts for pliability and signs of deterioration.
- Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The employer shall determine that the regulator and warning devices function properly.

For respirators maintained for emergency use, the employer shall:

- Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.
- Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

### Repairs

When respirators are damaged or fail inspection, they must be repaired or discarded and replaced. Repairs will be made only by persons who have been appropriately trained. Only the manufacturer's NIOSH-approved replacement parts designed for the respirator will be used. All repairs will be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed. Reducing and admission valves, regulators and alarms shall be adjusted or repaired only by the manufacturer.

### Breathing Air Quality

The park must ensure that compressed air used for respirators meets specifications of ANSI/Compressed Gas Association Commodity Specification for Air. These specifications include the following:

- Oxygen content (v/v) of 19.5-23.5%.
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less.
- Carbon monoxide (CO) content of 10 ppm or less.
- Carbon dioxide content of 1,000 ppm or less.
- Lack of noticeable odor.

Cylinders used to supply breathing air to respirators must be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178), have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air, and the moisture content in the cylinder does not exceed a dew point of -50°F at 1 atmosphere pressure.

All compressors used to supply breathing air to respirators are constructed and situated so that the air supply cannot become contaminated. They will be equipped with in-line air-purifying sorbent beds and filters to further ensure breathing-air quality. Sorbent beds and filters must be maintained and replaced or refurbished periodically following the manufacturer's instructions.

To protect breathing air from carbon monoxide, compressors that are not oil-lubricated must be monitored to ensure that carbon monoxide levels do not exceed 10 ppm. For oil lubricated compressors, a high-temperature or carbon monoxide alarm, or both, must be used to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

Breathing-air couplings must be incompatible with outlets for non-irrespirable air or other gas systems.

### User Seal Checks

Facepiece seal checks shall be performed by the wearer of tight-fitting respirators to ensure that an adequate seal is achieved each time the respirator is worn. Either the positive and negative pressure checks listed in this appendix or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

- A. *Positive Pressure Check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.
- B. *Negative Pressure Check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s). Inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.
- C. *Manufacturer's Recommended User Seal Check Procedures.* The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

## Appendix F. Cartridge and Canister Change-Out Schedule

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The ability of cartridge and canister air-purifying elements to effectively remove chemical contaminants is affected by the exertion level of the worker, differences in the manufacture of the cartridge, ambient temperature, humidity and the properties and interaction of multiple contaminants.

If there is no cartridge End of Service Life Indicator (ESLI) appropriate for conditions in the employer's workplace, the park must implement a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life.

There are several methods that can be used to meet this requirement and ensure that cartridge use is not extended beyond its capacity. The method and calculations used for the determination must be documented.

1. **Rule of Thumb:** One rule of thumb presented by the American Industrial Hygiene Association provides for a coarse estimate of service life for organic vapors.

“If a chemical's boiling point is >94°F and the concentration is less than 200 ppm, you can expect a service life of 8 hours at a normal work rate.”

**Note:** This basic rule must be modified for work rate, chemical concentration and humidity.

- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of 10 will increase service life by a factor of five.
- Humidity above 85% will reduce service life by 50%.

**Note:** This rule provides only an estimate of service life and should be supported by other methods.

2. **Mathematical Predictive Modeling:** Mathematical models may be used to predict service life. One predictive model has been developed by G.O. Wood. This model utilizes chemical and physical properties to estimate the breakthrough time. OSHA has precalculated breakthrough for several compounds and concentrations for given sorbent specifications. A second model, the Yoon-Nelson Mathematical Model, is a descriptive model that uses experimental data to calculate parameters that are then entered into the model.

- 3. Manufacturer's Objective Data:** Probably the most expeditious method is to obtain cartridge-model-specific data directly from the manufacturer. To use this method, the expected concentration of the contaminants, the relative humidity in the work area and the work rate must be known.

Manufacturers can provide breakthrough information via telephone or fax, but most have easy to use Web-based tools that can be used to calculate service life using specific information about the working conditions that you input. Several manufacturers and the Web site addresses for their service-life calculators are shown below:

MSA:

<http://www.msanet.com/msanorthamerica/msaunitedstates/resptest/index.html>

3M: <http://csrv.3m.com/csrv/>

North: <http://www.survivair.com/>

- 4. Documentation.** The park must describe in the respirator program the information and data relied upon, the basis for the canister and cartridge change schedule, and the basis for reliance on the data. A sample Cartridge Change Schedule Documentation form is provided.

## CARTRIDGE CHANGE SCHEDULE DOCUMENTATION

Job/Task: \_\_\_\_\_ Location: \_\_\_\_\_

Respirator Manufacturer: \_\_\_\_\_

Respirator Model: \_\_\_\_\_

Cartridge Model and Description: \_\_\_\_\_

### Contaminants

Chemical Name	Exposure Limit	Anticipated Concentration	Boiling Point	

### Patterns of Use:

Number of shifts per week: \_\_\_\_\_ Hours cartridge used during shift: \_\_\_\_\_

Estimated work rate ☐ Light ☐ Moderate ☐ Heavy

### Environmental Data:

Maximum expected Temp: \_\_\_\_\_ °C Maximum expected rH: \_\_\_\_\_ %

### Basis for Service Life Estimate

- Rule of Thumb:
- Laboratory Data (Attach Data)
- Mathematical Model (Identify Model Used and Attach Result)
- Mole Fraction Calculation for Mixtures

Calculate the predicted service time of each material in the mixture by multiplying its mole fraction by its single substance service time. Breakthrough time for the mixture is based on the chemical with the shortest predicted service time in mixture.

Chemical	Concentration	Single Substance Service Time	Mole Fraction* Predicted Service	Time in Mixture

\*Mole fraction + ppm of chemical / total ppm of mixture

### Cartridge Change Schedule:

- Every \_\_\_\_\_ Hours
- After Each Shift
- After One Week
- Other (Specify): \_\_\_\_\_

## **Appendix G. Employee Training**

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### *Respiratory Protection Program Administrator Training*

The RPPA must be qualified by training and experience to carry out the duties and responsibilities of overseeing the respiratory protection program and evaluating its effectiveness. Several training programs and providers are available, such as the OSHA 222A Course.

### *Employee Training*

The park shall institute a training program in respiratory protection for all workers who are required to wear respirators. Employee training must be provided prior to allowing the employee to use a respirator and shall include, at a minimum, the following topics:

1. Why the respirator is necessary and how improper fit, usage or maintenance can compromise the protective effect of the respirator.
2. What the limitations and capabilities of the respirator are.
3. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
4. How to inspect, put on and remove, use and check the seals of the respirator.
5. What the procedures are for maintenance and storage of the respirator.
6. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
7. The general requirements of the park and the NPS Respiratory Protection Program.

At the conclusion of the training, workers must be able to demonstrate knowledge and skills.

Training will be repeated annually to provide reinforcement and updated (or more frequent) information whenever a situation arises in which it appears retraining is necessary to ensure safe respirator use. Such situations may include changes in workplace conditions or equipment or when it becomes apparent that an employee has not retained the required understanding or skill to ensure safe respirator use.

The park shall maintain a record of educational and training programs for each worker for the duration of employment plus one year. On termination of employment, the employer should provide a copy of the training record to the worker. (see Appendix F, Record-Keeping).

## **Appendix H. Voluntary Use of Respirators**

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Employees may desire to wear respirator protection for reasons of personal comfort or preference in the absence of respiratory hazards in the workplace that would require the use of a respirator. This practice shall be allowed only when certain basic requirements are met.

### **Voluntary Use of Filtering Facepiece Respirators (Dust Masks)**

*Filtering Facepiece Respirators* are negative pressure particulate respirators with the filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. They are often referred to as dust masks.

The following conditions shall be met when respirators are used voluntarily.

1. The workplace shall be free of atmospheric hazards that would require the use of a respirator.
2. An evaluation conducted of the workplace and circumstances has determined that use of the respirator will not in itself create a hazard.
3. Voluntary use has been approved by the RPPA.
4. Voluntary users of respirators shall be provided a copy of the *Information for Employees* contained in this Appendix.

### **Voluntary Use of Respirators Other Than Filtering Facepieces**

In addition to the conditions above, medical evaluation as described in Appendix C shall be provided when respirators other than filtering facepieces are used voluntarily.

## Information for Employees Using Respirators When Not Required—Voluntary Respirator Use

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*This information shall be provided to every employee who uses a respirator on a voluntary basis when respirator use is not required.*

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or is not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposure to hazards, even if the level of hazardous substances does not exceed the limit set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

## **Appendix I. Record-Keeping**

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### **Fit-Test Records**

Fit-test records will be maintained until the next fit test is administered. Each fit-test record must contain the employee identification; type of fit test; date last tested; the results of the test; and the make, model and size of the respirator tested.

### **Medical Evaluations**

Medical evaluations are normally kept by the PLHCP. However, the park must maintain the PLHCP's written recommendation. This record must be maintained for the duration of employment plus one year.

### **Cartridge Change-Out Determinations**

A record will be kept of cartridge change-out schedule determinations for as long as the respirator cartridge is in service.

### **Exposure Monitoring**

All workplace exposure evaluations and personal exposure monitoring records will be maintained for the duration of employment plus one year.

### **Training Records**

Training records will be maintained for the duration of employment plus one year.

## **4.4 HAZARD COMMUNICATION**

### **National Park Service Hazard Communication Policy**

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National Park Service employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. Parks shall provide this needed information to employees through implementation of a Hazard Communication Program.

#### **Scope**

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This policy and program addresses the use of hazardous chemicals and materials by all employees and volunteers. It applies to all employees and volunteers who may be exposed to hazardous chemicals in the course of their duties. Most small laboratories within the NPS, such as those located at water treatment facilities, photographic laboratories or those established as a part of a natural resources management or investigation activity, are characterized by limited facilities where a fixed number of analyses or routine procedures are conducted. These laboratories will follow the requirements of the hazard communication program. Other, larger laboratory facilities will comply with requirements of 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.

#### **References**

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1. 29 CFR 1910.1200 Hazard Communication (prescribes minimum requirements for a hazard communication program).
2. 29 CFR 1910.1020 Access to Employee Exposure and Medical Records.
3. 29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in laboratories

#### **Program Elements**

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1. *Identify Hazardous Chemicals.* An inventory shall be conducted of all hazardous chemicals in the park. The inventory will be updated as new chemicals are purchased. The inventory will be made available to all employees who use hazardous chemicals or who may potentially be exposed to them.
2. *Maintain Material Safety Data Sheets.* Material Safety Data Sheets (MSDS) shall be obtained and maintained for each product listed on the park's hazardous chemical inventory. The MSDS provides information needed to ensure you have implemented proper protective measures for exposure. An MSDS must be available for each chemical used by park employees. Employees will not be allowed to use any chemical for

which an MSDS has not been received. An individual will be assigned the responsibility of obtaining and maintaining MSDSs for every hazardous chemical in the workplace. MSDSs will be readily accessible to employees when they are in their work areas during their work shifts.

3. *Label Containers.* All hazardous materials containers shall be labeled to indicate the identity of the material, appropriate hazard warnings and name and address of the manufacturer.
4. *Provide Employee Information and Training.* Information and training shall be provided to all employees who use hazardous chemicals or who may potentially be exposed to them in their work area. Information and training will be provided at the time of their initial assignment and whenever new hazardous chemicals are introduced to their workplace. Employees will be informed of operations and presence of hazardous chemicals, the location and availability of the park's written hazard communication program, inventory of hazardous chemicals, methods for labeling containers and material safety data sheets. Employees shall be trained to detect chemical hazards in their workplace, understand physical and health hazards of those chemicals, and how to use, handle and protect themselves from exposure.
5. *Prepare a Written Hazard Communication Program.* The park shall prepare a written program that describes how the requirements for labels and other forms of warning will be met, how and where materials safety data sheets will be maintained, how employee information will be provided, how employees will be informed and trained at the park, required protective measures and work practices, and how the park will share information with other employers working on the site.
6. *Review and Evaluate the Program.* The park shall review the park's Hazard Communication Program periodically to evaluate its effectiveness and ensure that it is current.

## Hazard Communication Program Implementation Action Items

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Step 1 ☐ *Identify Responsible Staff.* Park management and supervisors share the general responsibility of adherence to hazard communication policy and program implementation. Meeting program objectives and evaluating the success of the program will be enhanced by designating specific responsibilities. Designate individuals who will be responsible for:

- Updating the inventory of hazardous chemicals.
- Obtaining and maintaining Material Safety Data Sheets.
- Ensuring adequate, intact labeling of all hazardous chemical containers.
- Ensuring that initial and follow-up employee training is conducted.

Step 2 ☐ *Identify Hazardous Chemicals and Materials.* Survey the park to determine what hazardous chemicals are present, used or stored in the workplace. Your survey will result in the production of an inventory. The inventory becomes a component of the written program (Step 7), provides a list of products for which an MSDS must be obtained (Step 3), and must be available for employee information and training (Steps 5 & 6). The inventory must be kept up to date.

Step 3 ☐ *Obtain Material Safety Data Sheets.* Obtain a Material Safety Data Sheet for each hazardous chemical identified in the survey. MSDSs are obtained from the product manufacturer or distributor.

Step 4 ☐ *Label Every Container Containing a Hazardous Chemical.* Ensure that all hazardous materials and products purchased or received at the park are properly labeled. Labels must include the identity of the material (the identity must be linked to that on the inventory and the MSDS), hazard warning and the name and address of the manufacturer. Establish a standard system for labeling temporary or portable containers and inadequately labeled consumer product containers.

Step 5 ☐ *Establish Hazard Communication—Employee Right to Know Stations.* Make information about hazardous materials available to employees through the establishment of Hazard Communication—Employee Right to Know Stations. These stations will consist of:

- A list of all hazardous chemicals located at the work area covered by the station.
- A binder containing an MSDS for each hazardous chemical at the shop or work site.
- A copy of the park-specific Written Hazards Communication Program.
- Reference materials to assist workers in understanding MSDSs.

Step 6 ☐ *Train Exposed Workers.* Inform workers of the presence of hazardous chemicals and of operations using hazardous chemicals. Training and information must include information on hazards, information sufficient for the worker to understand the risk of exposure, protective measures (including personal protective equipment and safe handling, use and storage procedures), how to read a label and an MSDS, procedures for purchasing, and the mechanism for informing workers of hazards of non-routine tasks. Employees must be able to demonstrate their understanding in each of these topic areas. Failure to do so indicates the need for re-training.

Step 7 ☐ *Prepare a Written Hazard Communication Program.* The written program will describe your park's system for labeling and other forms of warning, how and where material safety data sheets will be maintained, how employee information will be provided, how employees will be informed and trained at the park, procedures and requirements for coordinating with and informing other employers (such as contractors and concessionaires), and procedures for evaluating program effectiveness. The sample program found in Appendix B may be used as a guide. The written program must reflect your park's specific organization, operations and procedures.

Step 8 ☐ *Evaluate the Effectiveness of Your Hazard Communication Program.* Review your written program and procedures at least annually to ensure they are current and effective. Conduct reviews at least quarterly of the accuracy of your hazardous chemical inventory, compliance with labeling requirements, maintenance of MSDSs and effectiveness of employee training.

## **Appendices**

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Appendix A: Written Hazard Communication Program

Appendix B: Hazardous Chemical Inventory

Appendix C: Material Safety Data Sheets

Appendix D: Labeling and Other Forms of Warning

Appendix E: Employee Information and Training

## Appendix A: Written Hazard Communication Program

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A written hazard communication program must be prepared that covers all workplaces where employees are exposed to hazardous chemicals. The written plan must describe how the program elements will be implemented at the park. It must be maintained at each work site. The written program must include the following:

1. An inventory of hazardous chemicals known to be present.
2. The labeling system used and other forms of warning.
3. Maintenance, availability and use of Material Safety Data Sheets.
4. Methods of providing employee information and training.
5. Methods the park will use to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
6. Methods the park will use to share information regarding hazardous chemicals use with other employee working in the park, so that all employees who potentially may be exposed may be informed. This includes the availability of MSDSs, labeling systems in use and actions to be taken in an emergency.

Where employees must travel between workplaces during a work shift (i.e., their work is carried out at more than one geographical location), the written hazard communication program may be kept at the primary workplace facility.

### *Sample Written Hazard Communication Program*

**Caution:** Although such general guidance may be helpful, you must remember that the written program must reflect what you are doing in your workplace. Therefore, if you use a generic program, it must be adapted to address the facility it covers. For example, the written plan must list the chemicals present at the site, indicate who is to be responsible for the various aspects of the program in your facility and indicate where written materials will be made available to employees.

## **Hazard Communication Program Your National Park**

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**Policy:** Your National Park employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. The park will provide this needed information through implementation of a Hazard Communication Program.

**Scope:** The Hazard Communication Program applies to all employees and volunteers. **Reference/Authority:** RM 50 B, National Park Service Occupational Safety and Health Program, requires parks to provide volunteers and employees protection from harmful substances in the workplace; 29 CFR 1910.160, Basic Program Elements for Federal Employee Occupational Safety and Health Programs, prescribes federal agency responsibility for adherence to occupational safety and health standards promulgated under OSHA; 29 CFR 1910.1200 Hazard Communication, prescribes minimum requirements for a Hazard Communication Program.

**Hazardous Chemical Inventory:** An inventory of hazardous chemicals used at the park has been prepared. The inventory will be maintained and revised as needed by the Safety Manager in order to keep it current and up to date. A pertinent list of hazardous chemicals will be available at each Hazard Communication Station. The Roads, Trails and Grounds Supervisor and the Museum Curator are responsible for providing updated information to the Safety Manager.

**Container Labeling:** All containers containing hazardous chemicals will be labeled with at least the following information:

- Identity of the chemical. The name used to identify the chemical must match that listed on the chemical inventory and the Material Safety Data Sheet. A number code must also be used to aid in cross-referencing the chemical label, inventory and MSDS.
- Precautionary statements. Appropriate precautionary statements are found on the MSDS.
- Name and address of the manufacturer or distributor.

The receiving supervisor will verify that all containers received are clearly labeled showing the contents, appropriate hazard warnings and the name and address of the manufacturer.

Secondary containers, such as applicator bottles and gasoline cans, will be labeled. The exception is when such secondary containers are used for no more than one work shift (filled and emptied in one work shift) and used only by the employee making the transfer. Work leaders, shop supervisors and division chiefs are responsible for ensuring that secondary containers are appropriately labeled.

Warning labels must be affixed to bags, barrels, bottles, boxes, cans, cylinders, drums, reaction vessels, storage tanks and any other type of container used to store chemicals. Shop supervisors shall ensure that warning labels are affixed to these containers and that they are legible and in good condition.

Pipes carrying chemicals do not have to be labeled, but employees will be informed about the hazards of any chemical piped through their work area.

Supplemental labeling and labels for secondary containers will conform to the American National Standard for Hazardous Industrial Chemicals—Precautionary Labeling, the Hazardous Materials Identification System (HMIS) or an equivalent system. Preprinted ANSI labels may be purchased from label providers and are appropriate for portable gasoline containers, drums and tanks. HMIS labels are appropriate for use on secondary containers such as applicator bottles. HMIS labels may be used in conjunction with other existing labels providing they do not obstruct or contradict other labels. Personal protective equipment ensemble recommendation codes will be defined on the label using text or pictorial representations.

Supplemental labeling is not required when consumer products are used according to their intended use and for the frequency and duration reasonably expected for consumers. However, when consumer products are used in regular work processes, the receiving supervisor will ensure that product labeling meets minimal label requirements and provide supplemental labeling when it is not adequate.

### Material Safety Data Sheets

Material Safety Data Sheets will be obtained and maintained for all hazardous chemicals present at the park. The Roads, Trails and Grounds Supervisor will be responsible for ensuring that an MSDS is obtained for each hazardous chemical received and that it is included in the MSDS binder in the Maintenance Shop Hazard Communication—Employee Right to Know Station. The Museum Curator will be responsible for ensuring that an MSDS is obtained for each hazardous chemical received and that it is included in the MSDS binder in the Resource Management Hazard Communication—Employee Right to Know Station.

MSDSs will be available to employees at “Hazard Communication—Employee Right to Know” stations at the following locations:

- Maintenance Auto Shop, outside Auto Mechanics Office.
- Visitors’ Center, Basement, Museum Curator’s Office.

Each Hazard Communication—Employee Right to Know station will consist of:

1. A list of all hazardous chemicals located at the work areas covered by the station.
2. A yellow binder containing an MSDS for each hazardous chemical at the shop or work site.
3. A copy of this written program.
4. Reference materials to assist workers in understanding MSDSs.

MSDSs will be available for view during each work shift. If employees are required to work at a remote site and would not otherwise have an opportunity to review MSDS at Hazard Communication stations, a portable Hazard Communication station containing MSDSs for materials that will be used at the remote site will be assembled and available at the remote work site.

Employees who have questions about a product or material, or require assistance in understanding an MSDS, should contact their supervisor. Additional assistance may be obtained from the Safety Manager.

When new hazardous materials are being considered for purchase, a product MSDS will be obtained by the requesting supervisor and reviewed with the Safety Manager for risk and suitability prior to purchase. MSDSs will be maintained as a part of the employee's exposure record.

*Employee Information and Training:* All employees who use or who may be potentially exposed to hazardous chemicals will receive hazard communication training. This training should take place prior to assignment of duties requiring the use of hazardous chemicals or where there is a potential for exposure. Initial employee training shall include at least the following:

- An overview of the Park Hazard Communication Program, the requirements of 29 CFR 1910.1200, the OSHA Hazard Communication Standard, and their application to park work sites and job tasks.
- Operations in the work area where hazardous chemicals are present.
- The physical location of the park's written program, including a list of hazardous chemicals, MSDSs and reference resources.

- The hazards of chemicals in the workplace and how to determine their presence or release in the workplace.
- Signs and symptoms of exposure to hazardous chemicals.
- How to read and interpret an MSDS and product labels.
- How to reduce or prevent exposure to hazardous chemicals through the use of engineering and administrative controls, safe work practices and personal protective equipment.

Additional training will be provided whenever a new hazardous chemical is introduced or when new hazards (new uses and exposure potential) exist. Returning furloughed and seasonal employees and volunteers will receive refresher training prior to resuming work with hazardous chemicals. Additional training will be provided whenever exposure incidents occur or when evaluation determines that employees require retraining or reinforcement.

*Non-Routine Tasks:* Non-routine tasks are those operations, such as water tank cleaning or specialty welding, which might occur infrequently. Prior to conducting these operations, workers and their supervisor or work leader will conduct a review of hazards. Review should minimally consist of a review of procedures or Job Hazard Analysis (JHA), pertinent MSDSs and protective measures.

Division chiefs are responsible for ensuring that employees in their divisions receive initial and follow-up hazard communication training as required. Division chiefs will coordinate with the Safety Manager for training opportunities. Training records will be maintained by the Safety Manager and will be kept for the duration of employment plus one year.

*Concessions and Contractors:* The Safety Manager will notify the Park Concessions Specialist of any hazardous material used by the park that concession employees may be exposed to during the course of providing concession services. Concessionaires shall inform the Park Concessions Specialist, who will in turn notify the Safety Manager, of hazardous material utilized by the concession to which park personnel and visitors might be exposed.

The Contracting Officer's Technical Representative (COTR), in coordination with the Safety Manager, will notify contractors of any hazardous materials used by the park to which they may be exposed. Conversely, contractors shall be required to notify the COTR in writing prior to using any hazardous material and to ensure that their employees have all applicable training in hazardous materials.

*Program Review and Evaluation of Effectiveness:* The Safety Manager, on behalf of the Superintendent, will periodically review the park's Hazard Communication Program to evaluate its effectiveness and ensure that it is current. Program elements such as labeling, maintenance of the hazardous chemical inventory and MSDSs, and employee training will be reviewed at least quarterly.

Approved:

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Superintendent

19 May 2003  
Date

## Appendix B: Hazardous Chemical Inventory

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A comprehensive list of hazardous chemicals in the workplace is a required part of the written hazard communication program. The list also serves as an inventory of products for which an MSDS must be maintained.

A *Hazardous Chemical* is any chemical that presents a physical hazard or a health hazard. The broadest possible perspective should be taken when doing the survey. Sometimes people think of “chemicals” as being only liquids in containers. The hazard communication standard covers chemicals in all physical forms — liquids, solids, gases, vapors, fumes and mists — whether they are “contained” or not. The hazardous nature of the chemical and the potential for exposure are the factors that determine whether a chemical is covered. If it’s not hazardous, it’s not covered. If there is no potential for exposure (e.g., the chemical is inextricably bound and cannot be released), the rule does not cover the chemical.

Look around. Identify chemicals in containers, including pipes, but also think about chemicals generated in the work operations. For example, welding fumes, dusts and exhaust vapors are all sources of chemical exposures. Read labels provided by suppliers for hazard information. Make a list of all chemicals in the workplace that are potentially hazardous. For your own information and planning, you may also want to note on the list the location(s) of the products within the workplace and an indication of the hazards as found on the label. This will help you as you prepare the rest of your program. Some chemicals are excluded. For example, food, drugs and cosmetics brought into the workplace for employee consumption and use are exempt.

The *Chemical Identity* is any unique term that describes the chemical. The term used to describe a chemical must be the same on the label, the MSDS and the inventory list of chemicals. The chemical identity provides a link between these three sources of information.

Hazardous chemical inventories may be kept electronically, such as in a database or on a spreadsheet. Still, hard copy of pertinent sections of the inventory must be available at each Hazard Communication—Employee Right to Know station.

**Hazardous Chemicals Inventory: *Hazardous Chemical Inventory.mdb***

Park: \_\_\_\_\_

Date: \_\_\_\_\_

MSDS #	LOCATION SHOP	PRODUCT NAME	PRODUCT DESCRIPTION	MANUFACTURER	MANUFACTURER'S ADDRESS	QTY	UNIT

## **Appendix C: Material Safety Data Sheets (MSDS)**

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The role of the MSDS is to provide detailed information on each hazardous chemical, including its potential hazardous effects, its physical and chemical characteristics, and recommendations for appropriate protective measures. Parks must have an MSDS for each hazardous chemical that they use. They should be received from the product supplier. If one is not received automatically, it must be requested.

MSDSs must be readily accessible to employees when they are in their work areas during their work shifts. This may be accomplished in many different ways. The Park must decide what is appropriate for its particular workplace. MSDSs may be kept in a binder in a central location such as in the pickup truck on a construction site.

Persons responsible for obtaining and maintaining MSDSs should be designated and included in the written plan. In addition the written plan should include:

- How MSDSs will be maintained at the park. For example, will MSDSs be kept in notebooks or in a computer with terminal access.
- How employees will have access to them when they are in their work area during the work shift.
- What procedures should be followed when the MSDS is not received at the time of the first shipment of the product.

MSDSs will be maintained as a part of the employee's exposure record.

## **Appendix D: Labeling and Other Forms of Warning**

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All containers of hazardous chemicals must be labeled, tagged or marked with the identity of the material and appropriate hazard warnings. Labels must include the identity of the material (the identity must be linked to that on the inventory and the MSDS), hazard warning and the name and address of the manufacturer. Parks may rely on the labels provided by suppliers if they contain all of the information required by the standard. Consumer products often do not contain all required information. In this case, supplemental labeling will be required.

The park should designate the persons responsible for ensuring that all containers that contain hazardous chemicals are labeled.

### *Secondary, Transfer and Temporary Containers*

Supplemental labeling is not required when consumer products are used according to their intended use and for the frequency and duration reasonably expected for consumers. However, when consumer products are used in regular work processes, the receiving supervisor will ensure that product labeling meets minimal label requirements and provide supplemental labeling when it is not adequate.

When hazardous chemicals are transferred into temporary containers, those containers must be labeled. The exception is when the chemical is used, consumed or returned to its original labeled container by the end of the work shift and the container remains in the control of the person that filled it.

Supplemental labeling and labels for secondary containers must meet the basic requirements of material identity, hazard warning and the name and address of the manufacturer. American National Standard for Hazardous Industrial Chemicals—Precautionary Labeling, the Hazardous Materials Identification System (HMIS) or an equivalent system may be used. When used correctly and consistently, these labeling systems exceed OSHA requirements and are recommended. Labels, such as the HMIS system, may be used in conjunction with other existing labels to provide consistency and additional information providing they do not obstruct or contradict other labels.

The labeling system used by a park must be described in the written hazard communication program.

### **Appendix E: Employee Information and Training**

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Information and training is a critical part of the hazard communication program. Each employee who may be exposed to hazardous chemicals when working must be provided information and training prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes. Exposure means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.) and also includes the potential for exposure.

Information regarding hazards and protective measures must be provided to employees through written labels and material safety data sheets.

Employees must be trained at the time of their initial assignment to work with a hazardous chemical and any time a new hazard is introduced into the workplace. Information and training may be done either by individual chemical or by categories of hazards, such as flammability or carcinogenicity. If there are only a few chemicals in the workplace, then the park may want to discuss each one individually. Where there are many chemicals or the chemicals change frequently, the park may want to train generally based on hazard categories.

The training must address the following topics at a minimum:

1. Types and locations of hazardous chemicals used in the workplace.
2. Methods used to detect the presence or release of a hazardous chemical in the work area, such as monitoring, visual appearance or odor.
3. Physical and health hazards of the chemicals in the work area.
4. Measures employees can take to protect themselves from chemical hazards, including specific procedures the park has implemented, such as safe work practices, emergency procedures and personal protective equipment to be used.
5. Details of the hazard communication program, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

Employee training records must be maintained for the duration of employment plus one year.

*Multi-employer Work Sites.* When employees, contractors or other employers working at the park are potentially exposed to hazardous chemicals, the park must provide labeling and MSDS information to the employer. When a contractor or other employer uses hazardous chemicals in the park that could result in an exposure of park personnel, the contractor or other employer must provide labeling and MSDS information about those chemicals to the park.

## **4.5 LABORATORY CHEMICAL HYGIENE**

### **National Park Service Policy**

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Each laboratory within each park will establish a chemical hygiene plan and program that is specific to the laboratory's operations in accordance with 29CFR1910.1450. The laboratory chemical hygiene plan is designed to reduce the possibility of injury or illness to employees by implementing specific procedures that will be followed when using hazardous chemicals in the laboratory.

#### **Scope**

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A laboratory chemical hygiene plan and program will be implemented under the following circumstances:

1. When chemical manipulation is conducted on a laboratory scale.
2. When multiple chemical procedures are used.
3. When procedures are not a part of production or simulated production.

National Park Service Laboratory facilities and operations that may typically fall within the scope of the Laboratory Chemical Hygiene program include resources laboratories, medical laboratories, wastewater treatment and air quality laboratories performing analysis for determining compliance with discharge criteria. Implementation of a chemical hygiene plan requires and assumes that protective laboratory practices and equipment are available.

Laboratories that conduct analyses as part of a production processes, such as water quality analysis in the production of drinking water, are not within the scope of this section or 20 CFR 1910.1450. For this type of operation the requirements of Hazard Communication standard will be followed to inform workers of chemical hazards and protective measures.

#### **References**

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1. 29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories.
2. 29 CFR 1910.84 Ventilation.
3. AIHA. 1995. Laboratory Chemical Hygiene, An AIHA Protocol Guide. American Industrial Hygiene Association.
4. USEPA Safety Health and Environmental Guidelines, Volume 1 Chapter 24, Chemical Hygiene Plan.
5. ANSI/AIHA. 2003. American National Standard – Laboratory Ventilation. ANSI/AIHA Z9.2—3. AIHA

## Program Elements

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1. *Chemical Hygiene Officer.* A Chemical Hygiene Officer (CHO) must be designated to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. The CHO must be qualified by training and experience to provide technical guidance in the development, implementation and periodic review of the chemical hygiene plan.
2. *Hazardous Chemical Inventory.* An inventory of chemicals used in the laboratory must be conducted and updated as new chemicals are purchased. The inventory must be made available to all employees that use hazardous chemicals or that may potentially be exposed to them. A site-specific list of chemicals in the laboratory should be prepared and will also be included as part of the Chemical Hygiene Plan.
3. *Material Safety Data Sheets (MSDS).* MSDS's for all laboratory chemicals must be maintained and readily available to employees in the laboratory.
4. *Protective Practices and Equipment.* Protective laboratory practices must be implemented and protective equipment must be available and in common use to minimize the potential for employee exposure to hazardous chemicals.
5. **Minimize chemical exposures.** Because many laboratory chemicals are hazardous, general precautions for handling all laboratory chemicals should be adopted, rather than providing specific guidelines for particular chemicals. All skin contact with chemicals should be avoided and all operations will be designed to minimize the amount of material used. Knowledge of specific route(s) of chemical exposure (i.e., inhalation, ingestion, absorption and injection) as well as the target organs of those chemicals will enable NPS employees to better protect themselves with appropriate engineering and administrative controls, and personal protective equipment.
6. **Special hazards.** For substances that present extraordinary hazards, special precautions will need to be taken. The assumption is also made that any mixture will be more toxic than its most toxic component, and that all substances of unknown toxicity are toxic. Additional safety procedure may be required for employees working with particularly hazardous substances such as select carcinogens, reproductive toxins and substances with a high degree of acute toxicity. Provisions for work with these types of chemicals may include special designated work areas, containment devices such as fume hoods or glove boxes, special handling procedures, special procedures for safe removal of contaminated wastes, and decontamination procedures.

7. **Provide adequate ventilation.** Adequate ventilation is required to maintain worker exposure below permissible exposure limits and Threshold Limit Values. The laboratory-type hood is a primary hazard control device that the laboratory worker depends upon for protection while working with hazardous materials. If designed, installed, operated and maintained properly, the laboratory fume hood will provide personnel with a high degree of protection and allow the user to work with a wide range of potentially hazardous material. Specific monitoring measures must be established for ensuring proper and adequate performance ventilation and other protective equipment.
8. *Chemical Receiving, Handling, Storage and Disposal.* Parks must establish procedures for receiving hazardous laboratory chemicals, their safe handling and storage, and proper disposal. Parks must ensure that labels on incoming containers of hazardous chemicals are not removed or defaced. Improper disposal of certain waste chemicals or other hazardous materials can cause fires, explosions, infections, release of toxic vapors and/or severe environmental damage. Safety and environmental considerations necessitate a good waste management program.
9. *Employee Exposure Determination.* The park must periodically measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level. The employee must be notified of the results within 15 working days after receipt of the monitoring results.
10. *Personnel Protective Equipment.* The use of personnel protective equipment may be necessary when feasible engineering and administrative controls are unavailable or there is a need to supplement those controls. When required, PPE will be provided by the park.
11. *Employee Information and Training.* All laboratory employees must be provided with information and training at the time of initial assignment to ensure they are aware of the chemical hazards in their labs. Additional training must be provided whenever there is a change in procedures, modification to the Chemical Hygiene Plan or use of a new chemical. Training must address the following topics:
  - a. The contents of this standard and its appendices must be made available to them.
  - b. The location and availability of the employer's Chemical Hygiene Plan.
  - c. The permissible exposure limits for OSHA.

- d. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- e. The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets (MSDS) received from chemical suppliers.
- f. Methods and observations that may be used to detect the presence or release of a hazardous chemical.
- g. The physical and health hazards of chemicals in the work area.
- h. The measures they can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures and personal protective equipment to be used.
- i. Applicable details of the employer's written Chemical Hygiene Plan.

12. *Medical Consultation and Examination.* The park must provide medical attention to laboratory employees who work with hazardous chemicals under the following circumstances:

- a. **Medical Examination.** When a laboratory worker develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.
- b. **Medical Monitoring.** When a laboratory worker is routinely exposed above the action level for an OSHA-regulated substance for which there are exposure monitoring and medical surveillance requirements. Refer to Section 4.9, Occupational Medical Screening and Surveillance for additional guidance.
- c. **Medical Consultation.** When an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure.

13. *Chemical Hygiene Plan.* Where hazardous chemicals are used in a laboratory covered by this section the park must develop and implement a written Chemical Hygiene Plan (CHP) that describes the specific measures that the park will take to ensure laboratory employee protection. The CHP must address the following elements:

- a. Standard safe operating procedures to be followed when laboratory work involves the use of hazardous chemicals.
- b. Criteria that the park will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices. Particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous.
- c. Specific measures and other requirements to ensure that laboratory-type hoods and other protective equipment are functioning and performing properly.
- d. Procedures for providing employee information and training.
- e. Evaluation and approval requirements prior to implementation of new laboratory operations or activities.
- f. Provision of medical consultation and medical examinations.
- g. Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer.
- h. Additional employee protection requirements for work with particularly hazardous substances, such as select carcinogens, reproductive toxins and substances that have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:
  - 1. Establishment of a designated area in which the work may be conducted.
  - 2. Use of containment devices such as laboratory-type hoods or glove boxes.
  - 3. Procedures for safe removal of contaminated waste.
  - 4. Decontamination procedures.

The CHP must be reviewed, evaluated for effectiveness and updated at least annually. The plan must be available to employees or their representatives.

## **Appendix B: Sample Chemical Hygiene Plan**

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Caution....

CHEMICAL HYGIENE PLAN  
FOR  
[YOUR PARK NAME]

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## 1.0 INTRODUCTION

The wastewater treatment laboratory is engaged in performing chemical and biological analyses from the [your park]'s wastewater, treated effluent, commercial wastes, receiving water and drinking water. [Your park] employees can potentially be exposed to many kinds of hazardous and toxic chemicals while being engaged in these kinds of analyses. In order to protect the employees from chemical exposure, the park has developed a comprehensive Chemical Hygiene Plan. All employees engaged in the laboratory use of hazardous chemicals are to comply with the requirements of this plan. The purpose of the policy is to protect employees from harm due to chemical exposure while they are working in the laboratory.

## 2.0 RESPONSIBILITIES

The Laboratory Director has been designated the Chemical Hygiene Officer (CHO) for the environment testing laboratories in \_\_\_\_\_. The chemical hygiene officer's responsibilities are:

1. The CHO will develop and update the Chemical Hygiene Plan in conjunction with the \_\_\_\_\_ Safety Office. The CHO will provide technical assistance for the implementation of this plan and remain current on developing legal rules and regulations concerning chemicals used in the laboratory.
2. The CHO will ensure that employees comply with this plan.
3. The CHO will ensure that adequate emergency equipment, in proper working order, is available and that proper training in the use of such equipment has been provided to laboratory workers.
4. Provide information on special or unusual hazards in non-routine work.

Laboratory personnel responsibilities are to:

1. Use proper personal protection and safety equipment.
2. Keep exposure to chemicals to a minimum.
3. Avoid eating, drinking and smoking in areas where chemicals are present.
4. Plan in advance before performing a chemical analysis.
5. Complete and keep current the park's laboratory chemical hygiene training program.

Every laboratory worker has a responsibility to himself or herself and fellow workers to plan and execute laboratory operations in a safe manner.

### 3.0 STANDARD OPERATING PROCEDURES

#### **3.1 General Principles for Laboratory Employees Working with Hazardous Chemicals:**

1. Each employee will follow the safety rules and procedures that apply to the work being conducted. Employees will understand the potential hazards and appropriate safety precautions associated with each operation before beginning any new procedure.
2. Know the location the emergency equipment in the laboratory and be familiar with its use. Employees will be trained to know the correct procedure for obtaining additional help in an emergency. In addition, employees must be familiar with the emergency procedures of the laboratory. To **obtain outside emergency aid, \_\_\_\_\_ on any phone.**
3. Be certain all chemicals are correctly and clearly labeled in accordance with the [your park]'s Hazard Communications Policy. Post warning signs when unusual hazards, such as flammable materials, biological hazards or other special problems exist.
4. Avoid distracting or startling any other worker. Practical jokes or horseplay will not be tolerated at any time.
5. Use equipment only for its designated purpose.
6. Position and clamp apparatus thoughtfully in order to permit manipulation without the need to move the apparatus until the entire reaction is completed. Combine reagents in the appropriate order, and avoid adding solids to hot liquids.
7. 7 Do not smell or taste chemicals. Equipment that can discharge toxic chemicals (i.e., vacuum pumps, distillation columns, etc.) must be vented into local exhaust fume hood.
8. Do not release toxic substances in cold rooms or warm rooms since these rooms use re-circulated air.

9. Avoid eating, drinking, smoking, gum chewing or applying cosmetics or lip balm in areas where laboratory chemicals are present. [Your park] has a “No Smoking” policy in all NPS buildings.
10. Avoid storing, handling or consuming food or beverages in storage areas, refrigerators used to store chemicals, glassware or utensils used for chemical analyses.
11. Wash areas of exposed skin thoroughly before leaving the laboratory. Wash promptly whenever a chemical has contacted the skin or eyes. Generally, flush the affected area with copious amounts of water for 15 minutes.
12. Keep work area clean and uncluttered with chemicals and equipment properly labeled and stored correctly. Clean up work area upon completion of an operation, analysis and experiment or at the end of each workday.
13. Laboratory workers will not use mouth suction for pipetting or starting a siphon. The use of suction bulbs is the appropriate method for pipetting.
14. Wear appropriate gloves and eye protection where chemicals are stored or handled. Use any other protective or emergency apparel and equipment as appropriate to protect everyone’s health and safety.
15. Avoid contact lenses while working in the laboratory.
16. Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls.
17. All laboratory personnel will know and understand the types of protective equipment available and will be trained in the selection of the appropriate PPE for each job.
18. Remove laboratory coats immediately after being significantly contaminated by chemical exposure.
19. Seek information and advice about the hazards. Plan appropriate protective actions and position equipment before beginning any new operations.
20. Use a laboratory fume hood for operations that might release toxic chemical vapors, gases, dusts, fumes or mists.
21. Confirm adequate fume-hood performance before use. Keep hood closed when adjustments are being made. Keep materials stored in hoods to a minimum, leave hood turned “on,” and do not allow materials to block vents or airflow.

### **3.2 Personal Hygiene**

1. Wash well with soap and water before leaving the laboratory. Do not wash with solvents.
2. Confine long hair and loose clothing when in the laboratory.
3. Avoid exposure to gases, vapors and aerosols. Use appropriate safety equipment whenever such exposure is likely.
4. Do not eat, drink, smoke or apply cosmetics in the laboratory.
5. Do not bring food, beverages, tobacco or cosmetic products into chemical use or storage areas. Do not store food in areas intended for chemicals or samples. Glassware or utensils that have been used for laboratory operations should never be used to prepare or consume food or beverages

### **3.3 Protective Clothing And Equipment**

All laboratory personnel will be provided with a sufficient number of lab coats for working in the laboratory. Inside the laboratory, the lab coat will be worn at all times when working with chemicals, samples and analytical processes. Lab coats will not be worn outside of the laboratory (lunchrooms, employee lounges and administrative areas).

All laboratory personnel will be provided with a pair of safety glasses. For employees who require corrective lenses, prescription safety glasses will be made available. These safety glasses shall be used when handling all hazardous materials to reduce the risk of exposures via splash hazards. Examples of materials used in laboratory operations are concentrated acids, alkalis, ammonia; preparing solutions of such chemical; or carrying out any operation that contains the possibility of a liquid splash or other similar hazard.

When working with corrosive, allergenic, sensitizing or toxic chemicals, wear gloves made of material known to be resistant to permeation by the chemical and tested by air inflation (do not inflate by mouth) for the absence of pin-hole leaks. Gloves are also to be used when handling \_\_\_\_\_, or any other material suspected of containing pathogenic organisms.

Shorts or short skirts will not to be worn in the laboratory. Always wear low-heeled shoes with fully covered uppers and non-slip soles. Do not wear shoes with open toes or with uppers constructed of woven or porous material.

Carefully inspect all protective equipment before using. Do not use defective protective equipment.

All mechanical equipment, such as vacuum pumps, will be adequately furnished with guards that prevent access to electrical connections or moving parts. Each laboratory worker will inspect equipment before using it to ensure that the guards are in place and functioning.

All employees are provided with hard hats. Hard hats are mandatory in all areas designated as hard-hat areas.

### **3.4 Housekeeping**

1. Access to emergency equipment, showers, eyewashes and exits will never be blocked by anything, not even a temporarily parked cart.
2. All chemical containers must be labeled with at least the identity of the contents and hazards those contents present to users.
3. Keep all work areas, especially laboratory benches and hoods, clear of clutter.
4. Keep all aisles and hallways clear of chemicals.
5. All chemicals will be placed in their assigned storage areas at the end of each workday.
6. At the end of each workday, the contents of all unlabeled containers are to be considered wastes.
7. Biological, chemical and solid wastes will be properly labeled and kept in their proper containers.
8. Promptly clean up all spills, and properly dispose of the spilled chemicals and cleanup materials. (See Section 6.6)
9. All working surfaces will be cleaned regularly.
10. Chemicals will not be stored in aisles, on desks, on laboratory floors or in hallways. Chemicals may be stored on the floor in the chemical storeroom in the original shipping containers.

11. Remove broken glass from counters immediately and dispose of properly in marked containers. Do not use chipped, cracked or broken glassware.
12. Inoculated media used in microbiological tests in test tubes, petri dishes or other containers will be sterilized in the autoclave before it is disposed.
13. Only authorized personnel will be allowed into the laboratory area. The laboratory will be locked when not in use.

### **3.4 Prior Approval**

Employees must obtain prior approval to proceed with a laboratory task from the Laboratory Director whenever:

1. A new laboratory procedure or test is to be carried out.
2. It is likely that toxic limit concentrations could be exceeded or that other harm is likely.
3. There is a change in a procedure or test, even if it is very similar to prior practices. "Change as a procedure or test" means:
  - a. A 10% or greater increase or decrease in the amount of one or more chemicals used.
  - b. A substitution or deletion of any of the chemicals in a procedure.
  - c. Any change in other conditions under which the procedure is to be conducted.
4. There is a failure of any of the equipment used in the process, especially of safeguards such as fume hoods.
5. There are unexpected results.
6. Members of the laboratory staff become ill, if it's suspected that they or others have been exposed, or otherwise there's a suspected failure of any safeguards.

#### 4.0 CONTROL MEASURES AND EQUIPMENT

Chemical safety is achieved by continual awareness of chemical standards and by keeping the chemical under control by using precautions, including engineering safeguards such as hoods. Laboratory personnel will be familiar with the precautions to be taken, including the use of engineering and other safeguards when working with hazardous materials. Laboratory supervisors will be alerted to detect the malfunction of engineering controls and other safeguards. All engineering controls must be properly maintained, inspected on a regular basis and never overloaded beyond their design limits.

##### **4.1 Ventilation**

1. Laboratory ventilation will not be less than eight air changes per hour. This flow is not necessarily sufficient to prevent accumulation of chemical vapors. Work with toxic chemicals that have low air-concentration limits or that have high vapor pressures will always be conducted in a hood.
2. [Your park]'s environmental testing laboratories are equipped with one fume hood each. Fume hoods will be certified annually and inspected monthly for efficiency, to provide a minimum of 70- to 90-feet per minute face velocity of air flow.
3. Laboratory staff will understand and comply with:

The apparatus inside the hood will be placed on the floor of the hood at least six inches from the front edge.

- a. Fume hood windows will be lowered (closed) at all times except when necessary to raise (open) them to adjust the apparatus that are inside the hood. At an absolute minimum, the hood shall not be used with the sash any higher than the marked height for desired efficiency.
- b. The hood fan will be kept "on" whenever a chemical is inside the hood, whether or not any work is being done in the hood.
- c. In the event of a power failure or other hood failure, turn off the apparatus and evacuate the area until it is safe to return. If possible, use auxiliary ventilation to dissipate the vapors.
- d. Hood vent ducts and fans will be inspected annually to be sure they are both clean and clear of obstruction. Plant maintenance personnel will conduct inspections.
- e. Fume hoods will not be used as storage areas for chemicals, apparatus or other materials.

## **Flammable-liquid Storage**

1. Fire-hazard chemicals in quantities greater than 500 ml will be kept in the flammable storage cabinet.
2. Store only compatible materials inside the cabinet.
3. Do not store paper or cardboard or other combustible packaging material in the flammable storage cabinets.

## **Eyewash Fountains and Safety Showers**

1. An emergency eyewash fountain is located next to the sink in \_\_\_\_\_.  
A safety drench-type shower is located in the \_\_\_\_\_.
2. Showers and eyewash fountains will be inspected monthly.
3. Be sure that access to the eyewash fountains and the safety shower is not restricted or blocked by temporary storage of objects or in any other way.

## **4.4 Fire Safety**

1. A \_\_\_\_\_ fire extinguisher is located in the laboratories near \_\_\_\_\_.
2. In the event of a fire in the laboratory, the following procedure is to be followed.
  - a. Notify any personnel in the area, as well as the Shift Supervisor.
  - b. Shut off any gas or electricity, if necessary.
  - c. If hazardous materials are not involved, try to put out the fire using the \_\_\_\_\_ fire extinguisher if it can be done safely.
  - d. If the fire is not controllable, evacuate the area and call the fire department \_\_\_\_ (Put Telephone number here).

## **4.5 Evacuation**

Maps are posted throughout the plant showing various evacuation routes. Note that in case of a chlorine leak, the route will be away from, and upwind of, the chlorine source.

#### **4.7 Chemical Spill Kits**

1. Spill Control Kits for acids, caustics and solvents are located in the laboratory. Additional supplies are located in the outside storage area.
2. For small spills of acids and caustics, shaker bottles of neutralizers are located in various locations around the laboratory.
3. A mercury spill kit is located near \_\_\_\_\_. This is to be used in the case of a broken thermometer. Note that a broken thermometer in an oven presents the additional hazard of increased mercury vapors. Turn off the power to the oven immediately.
4. All mercury spill and chemical spills in excess of one gallon will be reported to the environmental compliance officer and the safety office.
5. For additional information on the cleanup of liquid spills, see Section 6.6.

#### **4.8 First Aid Kits**

1. First aid kits are located in the \_\_\_\_\_.
2. Report any injury, no matter how minor, to your supervisor. Fill out the appropriate injury reporting forms as soon as possible.

### **5.0 SPECIFIC SAFETY PROCEDURES**

#### **5.1 Strong Acids and Alkalis**

1. Never pour water into an acid. Keep acid away from combustible materials. Protect acid bottles from heat and sunlight. Immediately after emptying bottles, rinse them thoroughly. Keep the outside of acid bottles and the stoppers clean and dry.
2. Use appropriate gloves and safety glasses when handling acids or alkalis.
3. When corrosive materials have been spilled on lab floors or bench space, use the appropriate neutralizing agent and cleanup kit (see Section 6.6).
4. Flush any spill on your body or eyes with copious amounts of water for at least 15 minutes.

5. Do not pour strong acid into the sink. Dilute it with water before pouring it into the sink, and run water while disposing and for several minutes afterward. Ammonia and other strong alkalis will be neutralized with an acid before flushing.
6. For additional safe handling practices and procedures, consult the respective MSDS.

## **5.2 Carcinogens, Reproductive Toxins, Highly Acute Toxins**

1. Select Carcinogen: Any substance defined as such in 29 CFR 1910.1450 or its corresponding MSDS. Chemicals whose toxic properties are unknown: any chemical for which there is no known scientific data relating to its toxic characteristics.
2. Reproductive Toxin: Any substance identified in the applicable MSDS that affects either male or female reproductive systems and may impair the ability to have children.
3. Acute Toxin: Any substance in which the LD50 data described in the applicable MSDS causes the substance to be classified as a “highly toxic chemical” as defined in ANSI Z129.1.
4. Designated Areas: Those areas within the laboratory where work must be performed when using select carcinogens, reproductive and acute toxin or any chemical that may release vapors, mists or dusts. The work will be performed in fume hoods or glove boxes located in these areas.

When working with carcinogens, reproductive and acute toxins, the following controls and handling techniques shall be implemented:

1. Personnel protective clothing shall be worn at all times during operations which require the use of these chemicals as outlined in 4.0 of this plan.
2. Proper handling and storage procedures will be followed in accordance with the type of chemical used.
3. When feasible, all operations will be performed under a workable fume hood.
4. Only the smallest amounts of chemical will be utilized that is consistent with the requirements of the work to be done.

5. Designated work areas will be properly decontaminated when work is completed utilizing appropriate procedures.
6. The CHO shall institute additional control measures and specific precautions for chemical handling, as appropriate.
7. For additional safe handling practices and procedures, consult the respective Material Safety Data Sheet.

### **5.3 Organic Solvents**

1. All organic solvents shall be stored in the Flammable Storage Cabinet.
2. The analyst shall limit the volume of the organic solvent at the bench to a maximum of 1 L. The transfer of solvent from the storage container into the smaller container shall take place under a properly operating hood.
3. Use gloves suitable for the solvent in use.
4. Spills shall be cleaned up with the Solvent Spill Kit. (See Section 6.6)
5. For further specific details on the safe handling of a particular solvent, consult the MSDS before use.

## **6.0 CHEMICALS RECEIVING, HANDLING, STORAGE AND DISPOSAL**

### **6.1 Receiving**

1. All shipment containers are checked by laboratory personnel for the correct amount and the condition of the shipment. Containers are opened, and all the items are checked, dated and compared with the packing slip for the correct amount and identity. The chemicals are then placed in the proper storage area for that chemical.
2. New and updated MSDSs will be added to the current MSDS inventory. A copy of the MSDS will be forwarded to the safety office.
3. Chemical inventories will be updated when a shipment of material has arrived. The safety office will be notified of the inventory change.

## 6.2 Handling

The chemical requiring storage may be a solid or liquid. The hazardous nature of each chemical must be considered individually and in relation to other chemicals that may be stored in the same area. The hazardous nature of each chemical is labeled on the package and also on the container. Carefully read the instructions given on the package before attempting to open it. After opening the package, take out the chemical containers.

Chemicals can be grouped into the following categories: flammable, toxic, explosive, oxidizer, corrosive and water-sensitive chemicals.

1. *Flammable Chemicals:* All flammable chemicals, except when under use (container of not more than 1 liter), will be stored in the Flammable Storage Cabinet. Some of the common flammable liquids present in the wastewater laboratory are ethanol and acetone.
2. *Toxic Chemicals:* Most chemicals are considered toxic. In order to adequately evaluate the danger involved on exposure to them, the relationship between frequency, duration and concentration of exposure, and the toxic hazard must be known. *Toxic substances can enter the body by inhalation, ingestion or absorption through the skin, or by any combination of these routes.* Some chemicals will decompose to form toxic materials when in contact with heat, moisture or acids. The manufacturer gives information concerning toxicity and potential toxic hazards, to some extent, on the container. Additional information can be obtained from the respective MSDS. *Treat every substance as highly toxic unless you know definitely that it is not.* Highly toxic chemicals in a wastewater laboratory include: salts of cyanide, mercury, sulfides, etc.
3. *Oxidizing Agents:* These are chemicals that can supply energy to a reaction. Some examples of oxidizing agents common to a wastewater laboratory are: nitrates, nitrites and dichromates. Since oxidizing agents can initiate the combustion reaction, these materials present a definite fire hazard when stored with combustibles. Some oxidizing materials will react with oxidizing agents at room temperature to produce a fire or explosion.

*Oxidizing agents shall not be stored in the same area with any fuel such as flammables, organic chemicals, dehydrating agents or reducing agents. Any spill in the storage area will be cleaned up immediately.*

4. *Corrosive Chemicals*: Many acids and alkalis are corrosive to their containers, other materials in the storage area and body tissue. Acids react with many metals to form hydrogen gas. Alkalis may form hydrogen gas on contact with aluminum. Since hydrogen forms an explosive mixture with air, accumulation of hydrogen must be prevented.

Some of the corrosive chemicals are mineral acids (nitric, sulfuric, hydrochloric, etc.), organic acids (acetic), organic solvents (chlorinated hydrocarbon solvents, alcohols, etc.) and caustic alkalis.

### **6.3 Labeling**

In order to insure the safety of laboratory workers, the following pertains to the labeling of chemicals and chemical solutions:

1. Do not remove or deface existing labels on incoming containers of hazardous substances unless the container or subsequent containers are marked again with the required information.
2. All containers shall be properly labeled showing contents, physical and health hazards.
3. All labels and warnings are to be legible and prominently displayed.
4. All containers shall be labeled to show actual contents.
5. All hazardous chemicals will be properly labeled.
6. Portable or "batch" containers of a hazardous material will also contain a proper label once the container leaves the immediate control of the person making the transfer.

## 6.4 Storage

In determining the arrangement of chemicals in the storage area, the hazardous nature of each chemical must be considered. *“Incompatible chemicals” (as outlined below) will never be stored together:*

CHEMICAL	SEGREGATE FROM
Flammable liquids	Nitrate, Nitric Acids, Ammonia
Acids, Strong	Alkalis, Strong
Mercury	Ammonia
Nitric Acid	Acetic Acid, Sulfuric Acid, Flammable Liquids, Nitrites
Acetic Acid	Nitric Acid
Carbon, Activated	Oxidizers
Sodium Azide	Acids, Oxidizers
Nitrates	Acids, Nitrites
Nitrites	Acids, Oxidizers

Upon arrival in the laboratory, all chemical containers shall be dated and stored in the appropriate storage area. In the chemical storage area, *all chemicals will be arranged alphabetically in the shelves, except for incompatible chemicals*. Larger reagent bottles will be stored on the lower shelves or floor. All reagent containers shall be dated when first opened.

## 6.5 Disposal

1. No solvents or flammable liquids shall be disposed of in the sink. The spent solvents shall be collected in suitable containers.
2. Strong acids and alkalis shall be neutralized before being poured into the sink. The sink shall be flooded with copious amounts of water after the disposal of these chemicals.
3. Carcinogens and other dangerous chemicals shall not be disposed of in the sink. These spent chemicals shall be collected separately and disposed of as hazardous waste.
4. Special wastes are to be stored in the container provided.

5. All spent coliform media shall be sterilized in the autoclave before disposal.
6. For additional information on proper disposal of chemicals, see the respective MSDS.

## **6.6 Spill and Leak Response**

If a spill or leak of dangerous chemicals occurs in the laboratory, the following general procedures shall be used.

1. Notify persons in the immediate area of the spill.
2. Evacuate all nonessential personnel from the spill area.
3. If the spilled material is flammable, turn off ignition and heat source.
4. Avoid breathing vapors of spilled material.
5. Leave on or establish exhaust ventilation if it is safe to do so.
6. Secure supplies to effect cleanup.
7. During cleanup, wear appropriate apparel.

For handling of spilled liquids:

1. Confine or contain the spill to a small area. Do not let it spread.
2. For small quantities of inorganic acids or bases, use the appropriate Spill Kit, located in the laboratory. For small quantities of other materials, absorb with a non-reactive material, such as Spill Control Pillows, located on the BOD incubator.
3. Sweep up any broken glass and absorbent material.
4. Carefully pick up and clean any cartons or bottles that may have been splashed or immersed.
5. Dispose of residues according to safe disposal procedures.

For handling of spilled solids:

Generally, sweep spilled solids of low toxicity and place them in a solid-waste container for disposal.

## 7.0 EMPLOYEE TRAINING PROGRAM

All laboratory personnel will receive training in the general hazardous materials area.

The training program will ensure that each employee receives instruction in the following areas:

1. An in-depth explanation of the Material Safety Data Sheet (MSDS) and terms typically used in evaluation of the chemical nature and hazards associated with hazardous materials.
2. Understanding the routes of exposure and the ways in which hazardous materials can affect workers.
3. Understanding the methods commonly used to detect release of and exposure to hazardous substances.
4. Emergency spill procedures/contingency planning and procedures to follow if employees are exposed to hazardous materials.
5. The measures employees can use to protect themselves from these hazards, including specific procedures such as appropriate work practices, personal protective equipment and emergency procedures.
6. An overview of the requirements of the Hazard Communication Regulation, including employee rights under the regulation.
7. Steps NPS has taken to lessen or prevent employee exposure to hazardous substances.

A two-hour initial training course will be conducted for all laboratory workers with an annual one-hour refresher.

## 8.0 MEDICAL CONSULTATION AND MEDICAL EXAMINATIONS

**8.1 \_\_\_\_\_ will provide all employees who work in the laboratory with hazardous chemicals an opportunity to receive a medical examination under the \_\_\_\_\_ Medical Surveillance Program.** The \_\_\_\_\_ Medical Surveillance program is administered by the \_\_\_\_\_. This program consists of a baseline physical, blood tests, routine biennial exams and review of all examination data by a licensed physician. \_\_\_\_\_ has entered into an agreement with \_\_\_\_\_ to be the custodian of all medical records. Medical examinations and interpretation of results will be administered by \_\_\_\_\_'s medical review officer (MRO). Follow-up examinations may occur:

1. Whenever an employee develops signs or symptoms associated with hazardous chemicals to which the employee may have been exposed in the laboratory.
2. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA-regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
3. Whenever an event takes place in the work area such as a spill, leak explosion or other occurrence resulting in the likelihood of a hazardous exposure.

**8.2 All medical examinations and consultations will be performed under the direct supervision of the FOH MRO.**

The exam will be provided without cost to the employee, without loss of pay and at a reasonable time and place.

**8.3 NPS shall provide the following information to the physician:**

1. Identity of the hazardous chemical(s).
2. Description of the conditions under which the exposure occurred.
3. Description of the signs and symptoms of exposure that the employee is experiencing.

**8.4 \_\_\_\_\_ shall obtain a written opinion from the examining physician, which will include:**

1. Recommendations for further medical followup.
2. Results of the medical examination and any associated tests.
3. Any medical condition that may be revealed in the course of the examination, which may place the employee at increased risk as a result of exposure to a hazardous chemical, found in the workplace.
4. A statement that the employee has been informed by the physician of the results of the condition or medical examination and any medical condition that may require further examination or treatment.

9.0 MATERIAL SAFETY DATA SHEETS

10.0 CHEMICAL LISTING

## 4.6 BLOODBORNE PATHOGENS

### National Park Service Bloodborne Pathogens Policy

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Parks will implement a program to prevent or control employee exposures to blood or other potentially infectious material during the course of their duties in compliance with 29 CFR 1910.1030.

#### Scope

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This section covers all employees who could possibly be in contact with blood and other potentially infectious materials as a result of performing their jobs.

#### References

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1. 29 CFR 1910.1030 Bloodborne Pathogens
2. 29 CFR 1904.8 Reporting Criteria for Needlestick and Sharps Injuries.
3. 2001. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV and HIV and Recommendations for Postexposure Prophylaxis. Morbidity and Mortality Weekly Report (MMWR), 50(RR11); 1-42 (2001, June 29), 33 pages.

#### Definitions

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*Bloodborne Pathogen* is a pathogenic microorganism that is present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV).

*Occupational Exposure* is the reasonably anticipated skin, eye, mucous membrane or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

*Exposure Incident* is a specific eye, mouth other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

*Other Potentially Infectious Materials* (OPIM) are any of the following: (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situation where it is difficult or impossible to differentiate between body fluids; (2) any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures and HIB or HBV-containing culture medium or other solutions; and blood, organs or other tissues from experimental animals infected with HIV or HBV.

*Regulated Waste* is a liquid or semi-liquid blood or other potentially infectious material; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

### Program Elements

1. *Employee Exposure Determination.* Determine which employees are at increased risk of occupational exposure to bloodborne pathogens. Exposure determination must include 1) a list of all job classifications in which all employees have occupational exposure, and 2) a list of job classifications in which some employees have occupational exposure. This second list will be accompanied by a list of all tasks and procedures that are performed by employees that could result in an occupational exposure in that list. Determination is made without regard to the use of personal protective equipment.
2. *Exposure Control Plan.* Prepare and implement a written Exposure Control Plan designed to eliminate or minimize employee exposure to blood or other potentially infectious materials. The plan must describe park-specific procedures to control exposure and must include:
  - Employee Exposure Determination
  - Program Responsibilities
  - Compliance Methods: Universal Precautions, Engineering and Work Practice Controls
  - Personal Protection Equipment
  - Housekeeping Procedures
  - Regulated (biohazard) Waste Management Procedures
  - Hepatitis B Vaccination and Declination, Exposure Incidents, Post-Exposure evaluations and Followup Policies and Procedures
  - Information and Training
  - Record-keeping
  - Hazard Communication
  - Program Evaluation

The Exposure Control Plan will be accessible to employees. It must be reviewed and updated at least annually and whenever necessary to reflect changes in occupational exposure in the workplace. The review and update must include changes in technology and consideration of commercially available medical devices that can be used to eliminate or reduce exposure

3. *Universal Precautions.* Universal precautions must be observed to prevent contact with blood or OPIM. Universal precautions is the concept of bloodborne disease control which requires that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV and other bloodborne pathogens.
4. *Engineering Controls.* Where engineering controls will reduce park employee exposure either by removing, eliminating or isolating the hazard, they must be used. Self-sheathing needles, puncture-resistant disposal containers for contaminated sharps, resuscitation bags and ventilation devices are examples of engineering controls. Engineering controls will be inspected monthly by the park to ensure their effectiveness.
5. *Work Practice Controls.* Parks will establish safe work procedures to reduce the risk of exposure.
6. *Labeling.* All containers of regulated waste or any container used to transport or store blood or other infectious material must be labeled with the biohazard symbol shown in Figure 4.6-1. Red bags or containers may be used instead of labeling. All first responders responding to first-aid accidents within the park will ensure that their first-aid kits contain red bags or biohazard labels.



7. *Personal Protective Equipment.* Personal protective equipment must be provided at not cost to all employees at risk of occupational exposure to bloodborne pathogens. Contaminated PPE must be removed prior to leaving the work area.
8. *Hepatitis B vaccination.* Hepatitis B vaccination must be made available to all employees who have occupational exposure to bloodborne pathogens within 10 working days of initial assignment and after appropriate training has been completed. Employees may decline HBV vaccination. If declined, the employee must sign an HBV Declination Form (Appendix E).
9. *Post Exposure Incident Follow-Up.* In the event that an employee is involved in an occupational exposure incident, the park must make a confidential medical examination and follow-up consultation immediately available to the employee. Post exposure follow-up requirements and procedures may be found in Appendix F.
10. *Reporting.* Parks must record all work-related needle-stick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material. The case must be entered on the OSHA 300 Log as an injury. To protect the employee's privacy, you may not enter the employee's name on the SHA 300 Log, but will maintain a "Sharps Injury Log." The sharps injury log shall contain, at a minimum:
  - The type and brand of device involved in the incident.
  - The department or work area where the exposure incident occurred.
  - An explanation of how the incident occurred.

The classification of the case must be updated on the OSHA Log if the case results in death, days away from work, restricted work or job transfer. You must also update the description to identify the infectious disease and change the classification of the case from an injury to an illness.

11. *Employee Training.* All employees with the potential for occupational exposure to bloodborne pathogens must participate in a bloodborne pathogens training program. Initial training will be provided at the time of assignment. Annual refresher training will be provided for as long as occupational exposure potential exists.

The training, at a minimum, must include the following: tasks which may cause exposure to blood or other potentially infectious material; the park's Bloodborne Pathogen Plan and how to access the plan; biohazard warning labels and their use; personnel protective equipment, emergency actions to be taken during an exposure incident, universal precautions, the park's vaccination program, post-exposure evaluation and follow-up; and regulated waste disposal procedures.

Training will be conducted by persons knowledgeable in the subject matter, will provide an opportunity for interactive questions and answers, and will include the following:

- A copy of 29 CFR 1910.1030.
- Epidemiology and symptoms of bloodborne diseases.
- Methods of transmission.
- An explanation of the park's Exposure Control Plan and how to obtain a copy.
- Recognition of tasks that present an exposure risk.
- Use, selection and limitations of protective measures.
- Information and Hepatitis B vaccine.
- Appropriate emergency actions.
- Post exposure incident procedures, medical examination and follow-up.
- Signs and labels.

12. *Record-keeping.* Medical Records. A medical record will include: training records, liability declarations, immunization records and exposure records including exposure evaluations. Medical records will be made available for employee review during normal work hours. Disclosure of this information without the employee's written consent by the Personnel Department is a violation of the Privacy Act. All employee records must be secured at all times and labeled "Confidential." Medical records will be kept for the duration of employment plus 30 years.

Training Records. Training records will include the employee's name and job title, topics covered, date and the name and qualifications of the trainer. Training records must be maintained for a period of three years from the date the training occurred.

Sharps Injury Log. The Sharps Injury Log will be maintained for five years beyond the end of the calendar year reported by the log.

13. Waste Management. Regulated waste shall be placed in containers that are:

- Closable.
- Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping.
- Labeled or color-coded.

Materials containing small amounts of blood, saliva or other secretions such as tainted gauze pads, sanitary napkins or facial tissues are not considered infectious waste. Disposal shall be in accordance with applicable local and state regulations.

## **Technical Appendices**

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Appendix A: Employee Exposure Risk Determination

Appendix B: Universal Precautions.

Appendix C: Personal Protective Clothing and Equipment

Appendix D: Work Practice Controls and Employee Exposure

Appendix E: Hepatitis B Vaccination and Declination

Appendix F: Post Exposure Evaluation and Follow-up

Appendix G: Sample Bloodborne Pathogens Exposure Control Plan

## **Appendix A: Universal Precautions**

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Since medical history and examination cannot reliably identify all patients infected with HIV or other bloodborne pathogens, care providers must consistently use blood and body-fluid precautions with all patients, including those in emergency care settings in which the risk of blood exposure is greater and the patient's infectious status usually is unknown. CDC currently recommends the "universal blood and body-fluid precautions" approach or "universal precautions."

All workers will routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when anticipating contact with any patient's blood or other body fluids. Personnel will wear gloves to touch patients' blood and body fluids, mucous membranes or broken skin; to handle items or surfaces soiled with blood or body fluids; and to perform venipuncture and other vascular access procedures. Personnel will change gloves after contact with each patient. Personnel will wear masks and protective eyewear or face shields during procedures likely to generate blood droplets or other body fluids to prevent exposure to oral, nasal or optic mucous membranes. Personnel will wear gowns or aprons during procedures likely to generate blood splashes or other body fluids.

If contaminated with blood or other body fluids, personnel immediately will wash hands and other skin surfaces thoroughly. All persons shall wash their hands after completing activities likely to expose them to BBPs and remove protective clothing before leaving the work area.

All health care workers will take precautions to prevent injuries caused by needles, scalpels and other sharp instruments or devices during procedures or when cleaning used instruments, disposing of used needles and handling sharp instruments after procedures. To prevent needle-stick injuries, personnel will not by hand directly recap needles, purposely bend or break them, remove them from disposable syringes or otherwise manipulate them. After using disposable syringes and needles, scalpel blades and other sharp items, personnel will dispose of them by placing them in puncture-resistant containers located as close to the use area as practical. Reusable needles will not be used.

Although research has not definitively implicated saliva in HIV transmission, it is prudent to use mouthpieces, resuscitation bags, or other ventilation devices instead of mouth-to-mouth resuscitation. These devices must be available for use in areas where the need for resuscitation is predictable.

Health care workers who have exuding lesions or weeping dermatitis will not provide any direct patient care or handle patient care equipment until the condition resolves.

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas with a reasonable likelihood of occupational exposure to BBPs.

Personnel shall not keep food and drink in refrigerators, freezers, shelves, drug storage areas or cabinets or on countertops or bench tops where blood or other potentially infectious materials are present.

Personnel shall perform all procedures involving blood or other potentially infectious materials in a manner that prevents droplets of these substances from splashing, spraying, splattering and generating.

Pregnant health care workers apparently do not face greater risk of contracting HIV infection than non-pregnant health care workers. However, if a health care worker develops HIV infection during pregnancy, the infant risks infection due to prenatal or perinatal transmission. Therefore, pregnant health care workers will thoroughly learn and strictly adhere to universal precautions to minimize the risk of HIV transmission.

## **Appendix B: Personal Protective Clothing and Equipment**

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### Gloves

Gloves are to be worn whenever employees anticipate hand contact with potentially infectious materials. Disposable gloves are preferred (followed by good hand-washing techniques). Gloves must be replaced upon any sign of deterioration or puncture. Hypoallergenic gloves, glove liners or similar alternatives must be provided to park employees who have natural rubber (latex) skin contact allergies.

### Resuscitator Devices

Resuscitator devices are to be readily available and accessible to park employees who can be reasonably be expected to perform resuscitation procedures. Emergency ventilation devices also fall under the scope of PPE and must be provided at no cost to the employees (i.e., masks, mouthpieces, resuscitation bags, shields/barriers). Park employees will be trained on proper use of each issued resuscitation device.

### Face Masks, Eye Protection and Face Shields

Appropriate face and eye protection such as a mask with glasses and solid side shields or a chin-length face shield shall be provided when splashes, spatters or blood droplets/infectious materials pose a hazard to the eyes, nose, mouth and mucous membranes.

### Protective Clothing

Gowns, aprons or disposable coveralls shall be worn whenever potential occupational exposure to the body is anticipated. Any contaminated garments must be removed immediately, identified as biohazardous and labeled to ensure proper laundering. It is the park's responsibility to not only provide PPE, but to also ensure that it is properly cleaned and maintained. Home laundering is prohibited since the park cannot ensure that proper handling and cleaning procedures were followed.

### Laundry Bags

The material for the bags or containers used for any laundry collection service, if undertaken within the park, must prevent soak-through or leakage of fluids to the exterior, if the contaminated laundry is wet and presents a reasonable likelihood of soak-through or leakage. Not all contaminated laundry must be placed in such bags or containers; only laundry wet enough to leak or soak through and expose workers handling the bags/containers to blood or other potentially infectious material, or contaminate other surfaces should be considered "contaminated laundry."

## **Appendix C: Work Practice Controls and Employee Exposure**

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This appendix provides sample work practice controls and discussion of exposure issues that may be useful in your park.

### **Sharps Containers**

Sharps disposal containers are classified as a medical device. They must be labeled or color-coded, puncture resistant, leak-proof, and closeable. They must have a well marked fill line, be translucent or have a translucent lid. NEVER OVERFILL THEM!

Shearing or breaking of contaminated sharps is completely prohibited. Bending, recapping or removing contaminated needles is prohibited as a general practice. Needles are expected to be used and immediately discarded (not recapped) into accessible sharps containers.

Contaminated evidence, sharps and/or specimens shall be placed in appropriate leak-proof biohazard containers as soon as possible.

### **Recapping Needles**

Bending, recapping or removing contaminated needles is prohibited.

### **Hand Washing**

Parks must provide hand-washing facilities that are readily accessible to employees. When provision of hand-washing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.

All park employees exposed to blood, blood products, blood components or other human bodily fluids must wash their hands as soon as possible with warm soapy water for a period of 20 seconds followed by use of an approved disinfectant. Antiseptic towelettes will be utilized if running water is not available at the scene of the incident/accident. Hands should then be washed again when hand-washing facilities equipped with running water become available.

Park employees utilizing disposable latex gloves for first-aid treatment or cleaning of potentially contaminated areas (e.g. toilets, sinks, etc.) must also wash their hands with warm soapy water along with a disinfectant as soon as possible after glove removal.

Park employees are to wash hands and any other contaminated skin areas utilizing the same procedure mentioned above. If blood or blood products enter the eyes or mucous membranes, flush with water immediately or as soon as possible for a minimum of 15 minutes.

### Contaminated Equipment

Any first aid equipment or contact surfaces of response equipment that may become contaminated must also be wiped down and cleaned with a disinfectant. Contaminated equipment or other contaminated items are not to be placed or stored in areas where food is kept, and decontamination should be accomplished as soon as possible following the incident/injury response. Cloths used to wipe contaminated equipment may be considered as regulated waste. All blood-contaminated cleaning supplies/materials must be placed in a red bag, properly labeled and packaged for disposal. Report all incidents immediately to your supervisor.

### Cleaning and Decontaminating Blood or Other Body Fluid Spills.

Each place of employment must be kept clean and sanitary. The park must ensure that all incidents where the potential for employee exposure to blood or other potentially infectious materials are cleaned up.

Use an EPA-approved germicide or recommended surface disinfectant agent to promptly clean all blood and blood-contaminated fluid spills. Workers must wear gloves. First remove visible material with disposable towels or other appropriate means that prevent direct contact with blood. If anticipating splashing, wear protective eyewear and an impervious gown or apron that provides an effective barrier to splashes. Next, decontaminate the area with disinfectant solution or an appropriate EPA-approved germicide. Clean and decontaminate soiled cleaning equipment or put it in an appropriate container and dispose of it according to clinic policy. Use plastic bags clearly labeled as containing infectious waste to remove contaminated items from the spill site. Remove gloves; then wash hands.

A written cleaning schedule is required under OSHA's Bloodborne Pathogen Standard.

### Disinfection Methods/Compounds

Disinfectants must have EPA registration as a sterilant (representing the highest level of antimicrobial activity that destroys all viruses), tuberculocidal disinfectants (effective against tuberculosis bacteria and specific viruses named on the product label as well as HIV/HBV efficacy claims). All disinfectants must be applied in accordance with the manufacturer's label instructions.

Diluted Household Bleach (½ cup per gallon of water 5.25% Sodium Hypochlorite) is the disinfection method of choice. Fresh solutions of diluted household bleach must be made up daily (every 24 hours). Household bleach is considered appropriate for disinfection of environmental surfaces and for decontamination of sites following initial cleanup

(i.e. wiping up spills of blood or other contaminated materials). Contact time for bleach is generally considered to be the time it takes for the product to air dry. Solutions of bleach should not be stored in glass containers, but in material such as plastic. Bleach may cause damage to some medical instruments and tools so care must be taken. Gross contamination should first be washed with a soap and water solution to ensure that the disinfectant is completely effective.

Iodine and quaternary ammonia products registered by the EPA can be used as substitutes for household bleach if registered on the label for the virus or bacteria of concern and only if the manufacturer's instructions for use are strictly adhered. More information on antimicrobial materials may be found on the following EPA Web site: <http://www.epa.gov/oppad001/>

### Eating/Drinking/Smoking

Eating, drinking, smoking, applying cosmetics or lip balm, and handling of contact lenses are prohibited in work areas. Food, drink and medications must not be stored in any areas where blood or infectious materials are present.

### Special Guidance for First Aid Providers

OSHA has provided an exception in its enforcement policy ([CPL 2-2.69] Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens) relating to Hepatitis B vaccination. Under this guidance, the park would not be cited if they have not offered the hepatitis B vaccination series to an employee whose only exposure to blood would be responding to injuries resulting from workplace incidents as long as this was only a collateral duty of the employee and certain other requirements have been met. Members of your AED Team would also fall under this category if the same conditions existed.

For this exception to be allowed, the first aid must be rendered only as a collateral duty, responding solely to injuries resulting from workplace incidents and generally at the location where the incident occurred.

**NOTE:** This exception does not apply to designated first aid providers who render assistance on a regular basis (i.e., at a first aid station, clinic, dispensary or other location where injured employees routinely go for assistance). Nor does it apply to any health-care, emergency or public safety personnel who are expected to render first aid in the course of their work. These employees must be offered the vaccine prior to exposure.

The park's exposure control plan must specifically address the provision of the hepatitis B vaccine to all unvaccinated first aid providers who render assistance in any situation involving the presence of blood or OPIM. The plan must include:

- Provision for a reporting procedure that ensures that all first aid incidents involving the presence of blood or OPIM will be reported before the end of the work shift during which the incident occurred. The report must include the names of all first aid providers who rendered assistance, regardless of whether personal protective equipment was used, and must describe the first aid incident, including time and date. The description must include a determination of whether or not, in addition to the presence of blood or other potentially infectious materials, an "exposure incident," as defined by the standard, occurred. This determination is necessary in order to ensure that the proper post-exposure evaluation, prophylaxis and follow-up procedures are made available immediately, whenever there has been an "exposure incident" as defined by the standard.
- A report that lists all such first aid incidents (that are readily available) upon request to all employees and to the Assistant Secretary.
- Provision for the bloodborne pathogens training program for designated first aid providers to include the specifics of this reporting procedure.
- Provision for the full hepatitis B vaccination series to be made available as soon as possible, but in no event later than 24 hours, to all unvaccinated first aid providers who have rendered assistance in any situation involving the presence of blood or OPIM, regardless of whether or not a specific exposure incident, as defined by the standard, has occurred.

#### Housekeepers, Custodians, Janitors

Individuals who perform housekeeping duties, particularly in patient care and laboratory areas, may be at increased risk for exposure when they perform tasks such as cleaning blood spills and handling infectious wastes. However, OSHA does not generally consider maintenance personnel and janitorial staff employed in non-health care facilities to have occupational exposure. Still, each park must determine which job classifications or specific tasks and procedures involve occupational exposure.

For example, OSHA expects products such as discarded sanitary napkins, to be discarded into waste containers, which are lined in such a way as to prevent contact with the contents. But at the same time, the employer must determine if employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash.

All park personnel who may come into contact with potentially contaminated laundry or trash bags must use extreme caution. Pick up the bag from the top to carry. Do not place your hands on the bottom of the bag because of the potential for discarded needles or syringes piercing the bag.

### *Feminine Hygiene Products*

OSHA does not generally consider discarded feminine hygiene products (used to absorb menstrual flow) to fall within the definition of regulated waste. The intended function of products such as sanitary napkins is to absorb and contain blood; the absorbent material of which they are composed would, under most circumstances, prevent the release of liquid or semi-liquid blood or the flaking off of dried blood. OSHA expects these products to be discarded into waste containers which are lined in such a way as to prevent contact with the contents.

In other words, custodial workers cleaning rest rooms would not be considered occupationally exposed under normal or routine circumstances. Please note, however, that parks must determine on a case-by-case basis whether their employees can come into contact with blood during the normal handling of such products from initial pick-up through disposal in the outgoing trash.

### *Maintenance Workers/Plumbers*

Trades such as plumbers, pipe fitters and others who may at times be engaged in maintenance activities are not generally considered to have occupational exposure as defined by the OSHA BBP standard. Although contact with raw sewage, such during the accidental rupture of a sewage line (not originating directly from a health care facility) poses a number of health hazards, these hazards are not related to bloodborne pathogens and so this exposure is not regulated under the BBP standard.

Still, the parks must determine which job classifications or specific tasks and procedures may place employees at risk. For example, plumbers performing repairs on pipes or drains in laboratories, operating rooms or mortuaries may have occupational exposure to blood or other potentially infectious materials.

Chance Encounters with Discarded Needles in Maintenance, Custodial and Gardening Situations.

The following procedures will be used when a needle is visually sighted:

- The shift supervisor is notified and assumes responsibility for the removal and disposal of the needle in accordance with procedures agreed upon with the governmental entity.
- Disposal procedures include requirement for the supervisor to wear protective safety clothing and glasses, and to pick up and place needle in sharps container using tongs.
- Sharps containers are labeled and handled as biohazard waste.
- The final disposal of sharps container is contractually the responsibility of the governmental entity.

If an exposure incident occurs among the manual sorters, work practices must be analyzed and changed to reduce the exposure potential. Otherwise, contact with blood may be reasonably anticipated, and the manual sorters would be considered to have occupational exposure.

## **Appendix D: Hepatitis B Vaccination**

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The Hepatitis B vaccination will be made available to all park employees who have occupational exposure.

The vaccine will be provided within 10 working days of assignment, at a reasonable time and place, at no cost to the employee (including travel expenses), and performed by or under the supervision of a licensed physician or other licensed health care professional whose scope of practice allows him or her to independently perform those activities (e.g., nurse practitioner). All vaccinations must be administered according to the recommendations of the U.S. Public Health Service. The only exception to the 10 day period would be if the park employee has previously received the complete Hepatitis “B” vaccination series, antibody testing reveals that the employee is immune or medical reasons prohibit the employee from taking the vaccine.

Any park employee who chooses not to receive the Hepatitis “B” vaccination series must complete and sign the Declination Form provided in this appendix. However, if this individual changes his/her mind at a latter date they will still be able to receive the HBV vaccination series.

If the vaccination series is interrupted after the first dose, the second dose should be administered as soon as possible. The second and third doses should be separated by at least 2 months. If only the third dose is delayed, it should be administered when convenient.

## HEPATITIS B VACCINATION RECORD

### EMPLOYEE INFORMATION

Please Print

NAME: \_\_\_\_\_  
LAST FIRST MIDDLE LAST NAME (at birth)

☐ MALE ☐ FEMALE

\_\_\_\_\_  
SOCIAL SECURITY NUMBER

PLACE OF BIRTH: \_\_\_\_\_  
CITY STATE COUNTRY DATE OF BIRTH

AGENCY: \_\_\_\_\_ WORK LOCATION: \_\_\_\_\_  
CITY STATE

PHONE #: \_\_\_\_\_

### Patient Acknowledgement of Hepatitis B Information

Acceptance and receipt of the hepatitis B vaccine is acknowledgement that I have read the information about Hepatitis B and the Hepatitis B vaccine. I have had the opportunity to ask questions and understand the benefits and risks of this immunization. I understand that all 3 doses are required for the optimum immune response. However, as with all medical treatment, I also understand there is no guarantee that I will become immune or that I will not experience adverse side effects from the vaccine.

VACCINATION RECORD	DATE	HEALTH CARE PROVIDER SIGNATURE	SITE	DRUG MFR & LOT NUMBER	DATE EXP.
1 <sup>st</sup> Dose					
2 <sup>nd</sup> Dose-1 month after 1 <sup>st</sup>					
3 <sup>rd</sup> Dose-6 months after 1 <sup>st</sup>					
4 <sup>th</sup> Dose (only if prescribed by health care provider)					
5 <sup>th</sup> Dose (only if prescribed by health care provider)					
6 <sup>th</sup> Dose (only if prescribed by health care provider)					

**HEALTH CARE PROVIDER ADDRESS, PHONE & FAX:**

(If vaccine provided for post-exposure follow up) **Mail or fax this form to:**

**DECLINATION FORM**

NO, I do not want HEPATITIS B VACCINATION

**EMPLOYEE INFORMATION**

Please Print

NAME: \_\_\_\_\_  
LAST FIRST MIDDLE LAST NAME (at birth)☐ MALE ☐ FEMALE

SOCIAL SECURITY NUMBER \_\_\_\_\_

PLACE OF BIRTH: \_\_\_\_\_  
CITY STATE COUNTRY DATE OF BIRTHAGENCY: \_\_\_\_\_ WORK LOCATION: \_\_\_\_\_  
CITY STATE

PHONE #: \_\_\_\_\_

**HEPATITIS B VACCINATION DECLINATION**

I understand that, due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no cost to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I may continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no cost to me.

EMPLOYEE SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

THE NEXT THREE ITEMS ARE OPTIONAL:

- ☐ I have previously received hepatitis B vaccination(s)  
(last shot completed ☐ 1, ☐ 2, ☐ 3 and date \_\_\_\_\_)
- ☐ I have already had hepatitis B disease (previously called serum hepatitis).

OTHER REASON: \_\_\_\_\_

**(If Vaccine declined for post-exposure follow up)**

Mail or fax this form to:

## **Appendix E: Post Exposure Evaluation and Follow-Up**

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An exposure incident is a specific eye, mouth other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties. Park employee exposures may include the following:

- An employee injury from contaminated needles or other sharps.
- An employee sustaining a human bite injury.
- Mucous membrane contact with blood or other potentially infectious material.
- Direct contact with injured patient's blood or bodily fluids during first aid treatment.

In the event that an employee is involved in an occupational exposure incident, the park must make a confidential medical examination and follow-up consultation immediately available to the employee.

**Employee Responsibilities.** Whenever an occupational exposure to blood or other infectious materials occurs, the employee will take the following steps:

- Initiate appropriate cleaning and/or first aid at exposure site.
- Identify the source of exposure.
- Report incident to his/her immediate supervisor.

### **Source Individual Testing**

The park must identify and document the source individual if known, unless it can establish that identification is not feasible or is prohibited by state or local law. The source individual's blood must be tested as soon as feasible after consent is obtained in order to determine HIV and HBV infectivity. The information of the source individual's HIV and HBV testing must be provided to the evaluating health care professional. The results of the testing must be provided to the exposed employee. The exposed employee must be informed of applicable laws and regulation concerning disclosure of the identity and infectious status of the source individual.

### **Counseling**

The park must provide the health care provider with the following documents and information:

- A copy of the standard.
- A description of the employee's duties as they relate to the exposure incident.
- Documentation of the route(s) and circumstances of the exposure.
- Results of the source individual's blood testing if available.
- All medical records relevant to the appropriate treatment of the employee, including vaccination status, which are the employer's responsibility to maintain.

Post-exposure prophylaxis (treatment) with Hepatitis B Immune Globulin (HBIG) (passive immunization) and/or vaccine (active immunization) should be used when indicated (e.g., after any park employee has a percutaneous (needle stick or cut from sharps) or mucous membrane exposure to blood (known or suspected) to be HbsAg-positive).

Needle stick or other percutaneous exposures of unvaccinated persons should lead to initiation of the Hepatitis B vaccination series. Post-exposure prophylaxis should be considered for any percutaneous, ocular (eye) or mucous membrane exposure to blood in the workplace and is determined by the HbsAg status of the source and the vaccination and vaccine-response status of the exposed park employee.

If the source of exposure is HbsAg positive and the exposed person is unvaccinated, HBIG should also be administered as soon as possible after exposure (within 24 hours) and the vaccine series has been started. The effectiveness of HBIG when administered >7 days after an exposure incident is unknown. If the exposed park employee had an adequate antibody response ( $\geq 10$  mIU/mL) documented after the vaccination series through post-titer testing) no testing or treatment is needed, although administration of a booster dose of vaccine can be considered.

Park personnel who do not respond to the primary vaccine series (confirmed through post-titer testing) should complete a second three-dose vaccine series or be evaluated to determine if they are HbsAg-positive. Re-vaccinated employees should be re-tested at the completion of the second vaccine series. Park employees who prove to be HbsAgpositive must be counseled by their physician.

### HIV (AIDS) Testing

Any exposed park employee has the opportunity for future testing without the need for an immediate decision. Employees involved in an exposure incident have at least 90 days following baseline blood collection to decide if they wish to have their blood tested for HIV. To the employee, HIV testing may present adverse ramifications, (e.g., confidentiality, employment, prejudice or lack of medical information). Therefore, the 90-day time frame allows the potentially exposed employee the opportunity to participate in education, counseling or further discussions involving the exposure incident. Employers are required to preserve the blood that the employee consented to have drawn, if it was not tested for HIV initially, for at least the 90-day period.

### Exposure Incident Report

The park must prepare a report the results of the exposure incident evaluation. The report must contain the following information:

- Date and time of exposure.
- Details of the procedure being performed, including where and how the exposure occurred (If it's related to a sharp device, it should also list the type and brand of device and how and when in the course of handling the device the exposure occurred).
- Details of the exposure, including the type and amount of fluid or material and the severity of the exposure. For example, for a percutaneous exposure, note the depth of injury and whether fluid was injected. For a skin or mucous-membrane exposure, note the estimated volume of material and the condition of the skin (chapped, abraded, intact).
- Details about the exposure source. For example, was the source material contained HBV, HCV or HIV? If the source is HIV-infected, the stage of disease, history of antiretroviral therapy, viral load and antiretroviral resistance information should be noted, if known.
- Details about the exposed person. For example, identify the status of hepatitis B vaccination and vaccine-response status.
- Details about counseling, post exposure management and follow-up.

### Physician Supplied Information

Post-exposure evaluation and follow-up are to be provided to the employee consistent with the requirements outlined in 29 CFR 1910.1030 (Bloodborne Pathogen Standard). The park is required to obtain a written opinion from the Health Care Facility concerning the exposure incident and provide that opinion to the employee within 15 working days of completion of the original evaluation.

Employer access to the physician's written opinion is specifically allowed under the standard. However, the treatment facility's written opinion must be limited to very specific information regarding the employee's Hepatitis B vaccination status, including indication for such vaccine and whether such vaccine was administered (i.e., first shot had been given).

## **Appendix G: Bloodborne Pathogens Exposure Control Plan**

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Parks must prepare and implement a written Exposure Control Plan designed to eliminate or minimize employee exposure to blood or other potentially infectious materials. The plan must describe park-specific procedures to control exposure and must include:

- Employee Exposure Determination
- Program Responsibilities
- Compliance Methods: Universal Precautions, Engineering, and Work Practice Controls
- Personal Protection Equipment
- Housekeeping Procedures
- Regulated (biohazard) Waste Management Procedures
- Hepatitis B Vaccination and Declination, Exposure Incidents, Post-Exposure Evaluations and Follow-up Policies and Procedures
- Information and Training
- Record-keeping
- Hazard Communication
- Program Evaluation

The Exposure Control Plan must be accessible to employees and will be reviewed and updated at least annually.

### **Sample Written Bloodborne Pathogens Exposure Control Program**

**Caution:** Although such general guidance may be helpful, you must remember that the written program must reflect the conditions at your workplace. Therefore, if you use a generic program it must be adapted to address the facility it covers. For example, the written plan must indicate who is to be responsible for the various aspects of the program at your park, define job classifications for which exposures are possible, and provide park-specific exposure response procedures.

## **Bloodborne Pathogens Exposure Control Plan**

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[Your Park]

### Policy

[Your National Park] is committed to providing a safe and healthful work environment for our entire staff. In pursuit of this endeavor, the following bloodborne pathogens exposure control plan (ECP) is provided to eliminate or minimize occupational exposure to bloodborne pathogens in accordance with OSHA standard 29 CFR 1910.1030, "Occupational Exposure to Bloodborne Pathogens" and RM50B.

The ECP is a key document to assist [Your Park] in implementing and ensuring compliance with the standard, thereby protecting our employees. This ECP includes:

- Responsibilities and program evaluation requirements.
- Determination of employee exposure.
- Implementation of various methods of exposure control, including:
  - Universal precautions.
  - Engineering and work practice controls.
  - Personal protective equipment.
  - Housekeeping.
  - Regulated (biohazard) waste-handling procedures.
  - Labeling
- Hepatitis B vaccination.
- Post-exposure evaluation and follow-up.
- Employee information and training.
- Record-keeping.

### 1. Responsibilities

- a. John Hunter, EMS coordinator, is responsible for the implementation of the ECP and will maintain, review and update the ECP at least annually, and whenever necessary to include new or modified tasks and procedures. Mr. Hunter may be contacted at (123) 234-6485.

- b. Employees who are determined to have occupational exposure to blood or other potentially infectious materials (OPIM) must comply with the procedures and work practices outlined in this ECP.
- c. The following individuals will maintain and provide all necessary personal protective equipment (PPE), engineering controls (e.g., sharps containers), labels and red bags as required by the standard:
  - 1) [John Hunter], EMS coordinator, will ensure that adequate supplies of the aforementioned equipment is available for all health clinic and emergency services personnel in the appropriate sizes. [Mr. Hunter] may be contacted at the health clinic at [Headquarters Building 101, (123) 234-6485].
  - 2) [Susan Smith], Chief Maintenance Division, will ensure adequate supplies of the aforementioned equipment is available for all maintenance and interpretive staff in the appropriate sizes as required. [Ms. Smith] may be contacted at [Building 202, Maintenance yard, (123) 234-7890].
- d. [John Hunter] will be responsible for ensuring that all medical actions required are performed and that appropriate employee health and OSHA records are maintained. Contact location/phone number [(123) 234-5678].
- e. [Edward Miller], Safety Officer, will be responsible for training, documentation of training and making the written ECP available to employees, OSHA and NIOSH representatives. Contact location/phone number: [(123) 234-6485].

## 2. Determination of Employee Exposure

- a. The following is a list of all job classifications at [your park] in which all employees have occupational exposure:

<b>GS-025</b>	Park Ranger, Law Enforcement
<b>GS-070</b>	Correctional Officer
<b>GS-081</b>	Fire Fighter
<b>GS-083</b>	Police Officer
<b>GS-085</b>	Security Guard
<b>GS-189</b>	Recreation Aide/Technician (Lifeguard)
<b>GS-610</b>	Occupational Health Nurse
<b>GS-1811</b>	Criminal Investigator
<b>SP-083</b>	Park Police

- b. The following is a list of job classifications in which some employees at [your park] have occupational exposure. Included is a list of tasks and procedures, or groups of closely related tasks and procedures, in which occupational exposure may occur for these individuals:

GS-025	Park Ranger, Interpretation
GS-025	Park Ranger, Resource Management
	Park Volunteers

- c. The following tasks or closely related tasks may result in employee contact with blood or other potentially infectious material resulting in exposure to bloodborne pathogens.

- Drawing patient blood.
- Handling patient solid waste, linen and other materials.
- Examining patients, including contact with blood, body fluids and mucous membranes.
- Intubation.
- Performing procedures that produce extensive spattering of blood or body fluids.
- Working with victims of accidents, violence or illness.
- Clean up medical and rescue equipment after use.
- Restraining combative individuals.
- Designated to provide first aid for injured individual (First Responders).
- Examining criminal evidence contaminated with blood and body fluids.
- Handling regulated waste containing contaminated bandages, personal protection equipment and other supplies.
- Handling needles, sharps or other waste that are considered regulated (biohazard) waste.

### 3. Exposure Control

- a. Universal Precautions. All employees will utilize universal precautions.
- b. Engineering and Work Practice Controls
  - 1) Engineering and work practice controls will be used to prevent or minimize exposure to bloodborne pathogens.
  - 2) Engineering controls will be examined, maintained, or replaced at least annually by the park Emergency Medical Services Coordinator or at any time a defect or problem is suspected. The park EMS Coordinator will periodically review tasks and other duties of employees, as well as procedures performed, to assess the need for engineering control updates. An inspection will be conducted annually prior to the Exposure Control Plan Review to examine:
    - i. Operations where engineering controls are currently employed.
    - ii. Operations where engineering controls can be updated/replaced.
    - iii. Operations currently in need of engineering controls.
  - 3) Specific engineering controls and work practice controls that will be employed at [your park] are listed below:
    - i. Hand-washing facilities (or antiseptic hand cleansers and towels, or antiseptic towelettes) that are readily accessible to all employees who have the potential for exposure.
    - ii. Containers for contaminated sharps that have the following characteristics:
      - 1. Puncture-resistant.
      - 2. Color-coded or labeled with a biohazard warning label.
      - 3. Leak-proof on the sides and bottom.
      - 4. Sharps disposal containers are inspected and maintained or replaced by [John Hunter] or [Susan Smith] each quarter or whenever necessary to prevent overfilling.
    - iii. Specimen/evidence and secondary containers that are:
      - 1. Leak-proof.
      - 2. Color-coded or labeled with a biohazard warning label.
      - 3. Puncture-resistant (when necessary).

- 4) Work Practice Controls. Work practice controls are established to ensure minimum exposure to bloodborne pathogens. All supervisors, in conjunction with the park EMS Coordinator, are responsible for overseeing the compliance with the work practice controls. The following work practice controls must be followed by all employees at GGNRA Bloodborne Pathogen Control Program:
- i. Hand washing:
    - 1. Hands should be washed with soap under running water for at least 10-15 seconds prior to providing health or medical care to any person whenever feasible.
    - 2. Employees must wash their hands immediately, or as soon as possible, after removal of potentially contaminated disposable gloves or other personal protective equipment. If washing of the hands is not feasible, an antiseptic hand cleaner or waterless de-germers with clean paper towels, or antiseptic towelettes will be used until hand washing is possible.
    - 3. Following any contact with blood or any other potentially infectious materials, employees must wash their hands and any other exposed skin with soap and water as soon as possible. Exposed mucous membranes must be flushed with water as soon as possible following contact.
  - ii. Sharps:
    - 1. Contaminated needles and other contaminated sharps are not to be bent, sheared, broken, recapped or removed (needles from syringes) unless there is a demonstrated need for this action (e.g., required by the medical procedure).
    - 2. Contaminated evidence, sharps and/or specimens shall be placed in appropriate containers immediately, or as soon as possible, after use.
    - 3. If outside contamination of a primary sharps container occurs, that container shall be placed within a second container, appropriately labeled for handling and storage. If the sharps can puncture the primary container, the secondary container must be puncture-resistant as well.
  - iii. Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable risk of occupational exposure. The same is prohibited immediately after exposure until hands are washed.
  - iv. Food, drink and medications must not be kept in refrigerators, freezers, shelves, cabinets or on counter tops or bench tops where blood or other potential infectious materials are present.

- iv. Food, drink and medications must not be kept in refrigerators, freezers,shelves, cabinets or on counter tops or bench tops where blood or otherpotential infectious materials are present.
- v. Mouth pipetting/suctioning of blood or other infectious materials is prohibited.
- vi. All procedures involving blood or other potentially infectious materials shall be performed to minimize splashing, spraying, spattering and generation of droplets of the materials.
- vii. Contaminated evidence, specimens of blood or other material shall be placed in designated leak-proof containers and appropriately labeled for handling and storage.
- viii. Equipment that becomes contaminated must be examined prior to servicing or shipping and decontaminated as necessary. If the equipment cannot be decontaminated, then an appropriate biohazard-warning label must be attached to any contaminated equipment identifying the contaminated portions. Information regarding the remaining contamination shall be conveyed to all affected employees, the equipment service representative and/or the equipment manufacturer prior to handling, servicing or shipping. Equipment that cannot be decontaminated should be listed in park SOPs and included in the Hazard Communication program.
- ix. All at-risk park employees shall be trained regarding any work practice controls with which they are unfamiliar or not experienced.
- x. All contaminated trash shall be considered as regulated or biohazard waste and disposed of as prescribed in accordance with applicable federal, state and local regulations.

c. Personal Protection Equipment

- 1) Personal protective equipment will be provided at no cost to the employee in order to eliminate or minimize bloodborne pathogen hazards.
- 2) All work areas, including emergency response vehicles, shall be equipped with required personal protective equipment of appropriate size, quantity and quality.

- 3) To insure that PPE is not contaminated and is in the proper condition the following practices shall be adhered to:
- i. All appropriate PPE is inspected by the responsible employee each day and repaired or replaced as needed to maintain its effectiveness.
  - ii. Reusable PPE is cleaned, laundered and decontaminated as needed.
  - iii. Single-use PPE (or equipment that cannot, for whatever reason, be decontaminated) is disposed of as prescribed in this Plan for biohazard material disposal.
- 4) All potentially contaminated personal protective equipment is to be removed prior to leaving a work area or accident/incident site if possible, or as soon as practical.
- 5) Employees must receive training in the use and care of appropriate personal protective equipment. Personal protective equipment shall be used as required unless the use of the protective equipment will prevent the delivery of health care, public safety services or pose an increase safety hazard.
- 6) This equipment includes, but is not limited to:
- i. Gloves
    - 1. Gloves are worn whenever employees anticipate hand contact with potentially infectious materials. They are worn when handling or touching contaminated items or surfaces.
    - 2. Hypoallergenic gloves, glove liners and similar alternatives are readily available to employees who are allergic to the gloves normally provided. Gloves must be of appropriate material, latex or vinyl, and of appropriate size for each employee.
    - 3. Gloves should be changed with each new patient, or if torn, punctured or any loss of effectiveness as an exposure barrier.
    - 4. Utility gloves must be decontaminated for reuse unless they are cracked, peeling, torn or exhibit other signs of deterioration, at which time they must be disposed of.
  - ii. Face Masks, Eye Protection and Face Shields. Masks, eye protection or face shields shall be worn whenever splashes, spray, spatter or droplets of blood or other potentially infectious materials may be generated and eye, nose and mouth contamination can be reasonably anticipated.

- iii. Gowns. Gowns, aprons and other protective body clothing shall be worn whenever potential exposure to the body is anticipated. Any garments penetrated by blood or other infectious materials are removed immediately or as soon as practical. Contaminated protective clothing will be disposed of as biohazard waste.
  - iv. Resuscitation Equipment. Whenever practical, resuscitation (CPR) masks should be used.
- d. Housekeeping. Equipment and facilities in a clean and sanitary condition is an important part of the compliance of the Exposure Control Plan. To help ensure a clean environment, the following practices shall be employed:
- i. All equipment and surfaces must be cleaned and decontaminated after contact with blood or other potentially infectious material:
    - 1. After the completion of an examination of contaminated evidence.
    - 2. Immediately, or as soon as feasible, after surfaces are overtly contaminated.
    - 3. After a spill of blood or infectious materials.
    - 4. At the end of the work shift, if the surface may have been contaminated during that shift.
    - 5. Protective coverings (such as linens, plastic trash bags or wrap, aluminum foil or absorbent paper) must be removed and replaced as soon as possible when overtly contaminated or at the end of the work shift if they may have been contaminated during the shift.
  - ii. All trash containers, pails, bins and other receptacles intended for use must be routinely inspected, cleaned and decontaminated as soon as possible if visibly contaminated.
  - iii. All reusable emergency service equipment, such as resuscitation devices that have contacted the skin or mucous membranes, should be soaked in an appropriate commercial disinfecting product, which meets Environmental Protection Agency (EPA) requirements. Equipment surfaces (ambulance floors, walls, tables, gurneys, stretchers, MAST suits, backboards, etc.) that cannot be soaked must have a thorough physical cleaning that includes removal of any contaminated products.
  - iv. Broken glassware that may be contaminated must be picked up using mechanical means (such as broom and dustpan, tongs, forceps), but not by hand.

e. Laundry

- i. Employees shall remove any clothing that becomes contaminated. Clothing grossly contaminated with blood or other potentially infectious material will not be taken home for cleaning. This clothing will be discarded as contaminated waste material and replaced by the employer through normal procedures.

- 1. Employees can decontaminate clothing lightly contaminated by washing (hot water, detergent and a small amount of bleach) or by professional dry cleaning (point out the contaminated area to the dry cleaner).
- 2. All contaminated linen and clothing shipped to any facility shall be placed in water-impervious bags and clearly labeled or color-coded with biohazard warnings
- 3. The following contaminated articles will be laundered by this company: [Acme Cleaners, 101 Main Street, Downtown, PA (list)]
- 4. All other laundering will be performed by [Jim Parker] at the Maintenance facility laundry on [Monday a.m.].
- 5. The following laundering requirements must be met:
  - a. Handle contaminated laundry as little as possible, with minimal agitation
  - b. place wet contaminated laundry in leak-proof, labeled or color-coded containers before transport. Use (red bags or bags marked with biohazard symbol) for this purpose. Wear the following PPE when handling and/or sorting contaminated laundry:

- 1. Nitrile gloves

ii. Cleaning blood and/or body fluid spills:

- 1. For blood or other potentially infectious material, use an absorbent barrier to contain the spill.
- 2. Collect absorbent materials using items such as a dustpan and tongs. Do not pick up items by hand. All soiled materials are to be placed in a puncture-resistant and leak-proof container.
- 3. Once body fluids have been removed from the area, wash area thoroughly with water.
- 4. Rinse with a 10-percent chlorine bleach and water solution.
- 5. Rinse a second time with water.

- f. Regulated (Biohazard) Waste Management Procedures.
  - i. Contaminated items will be disposed of in containers specifically manufactured, labeled and approved for biohazard material as described below. The containers must then be disposed of according to and in accordance with applicable federal, state and local regulations.
  - ii. Contaminated materials can include, but are not limited to: used needles, soiled scalpels, disposable resuscitators, intubation equipment, used bandages, disposed personal protective equipment and other potentially infectious materials.
  - iii. Contaminated materials must be discarded in containers that are:
    - 1. Closeable.
    - 2. Puncture-resistant, if discarded materials have the potential to penetrate the container.
    - 3. Leak-proof, if the potential for fluid spill or leakage exists.
    - 4. Red in color or labeled with the appropriate biohazard warning label.
    - 5. Containers for regulated waste must be placed in appropriate locations in emergency response vehicles and facilities within easy access of employees and as close as possible to the source of the waste.
- g. Program Review. [Your park] identifies the need for changes in engineering control and work practices through Review of OSHA records, employee interviews and committee activities. New procedures or new products will be evaluated during regular safety committee meetings. Employees are encouraged to provide supervisors or safety committee members with suggestions for improved engineering and work practice controls.
- h. Labels. Supervisors will ensure warning labels are affixed or red bags are used as required if regulated waste or contaminated equipment is brought into the facility. Employees are to notify [John Hunter, EMS Coordinator at (123) 2345678 or Edward Miller, Safety Officer, at (123) 234-6485] if they discover regulated waste containers, refrigerators containing blood or OPIM, contaminated equipment, etc. without proper labels.

#### 4. Hepatitis B Vaccination

- a. [Edward Miller], Safety Officer, will provide training to employees on hepatitis B vaccinations, addressing the safety, benefits, efficacy, methods of administration and availability.
- b. The hepatitis B vaccination series is available at no cost after training and within 10 days of initial assignment to employees identified in the exposure determination section of this plan. Vaccination is encouraged unless: 1) documentation exists that the employee has previously received the series, 2) antibody testing reveals that the employee is immune, or 3) medical evaluation shows that vaccination is contraindicated. However, if an employee chooses to decline vaccination, the employee must sign a declination form. Employees who decline may request and obtain the vaccination at a later date at no cost. Documentation of refusal of the vaccination is kept with the employee's medical records in the personnel office.
- c. Vaccination will be provided by Federal Occupational Health (FOH) at the Main Street clinic.
- d. Following the medical evaluation, a copy of the health care professional's Written Opinion will be obtained and provided to the employee. It will be limited to whether the employee requires the hepatitis vaccine, and whether the vaccine was administered.

#### 5. Post-Exposure Evaluation and Follow-Up

- a. Should an exposure incident occur, contact your supervisor and [John Hunter, EMS Coordinator, at (123)234-5678].
- b. An immediately available, confidential medical evaluation and follow-up will be conducted by FOH at the Main Street clinic.
- c. Following the initial first aid (clean the wound, flush eyes or other mucous membrane, etc.), the following activities will be performed:
  - i. Document the routes of exposure and how the exposure occurred.
  - ii. Identify and document the source individual (unless the employer can establish that identification is infeasible or prohibited by state or local law).
  - iii. Obtain consent and make arrangements to have the source individual tested as soon as possible to determine HIV, HCV and HBV infectivity;

document that the source individual's test results were conveyed to the employee's health care provider.

- iv. If the source individual is already known to be HIV, HCV and/or HBV-positive, new testing need not be performed.
- v. Assure that the exposed employee is provided with the source individual's test results and with information about applicable disclosure laws and regulations concerning the identity and infectious status of the source individual (e.g., laws protecting confidentiality).
- vi. After obtaining consent, collect exposed employee's blood as soon as feasible after exposure incident, and test blood for HBV and HIV serological status
- vii. If the employee does not give consent for HIV serological testing during collection of blood for baseline testing, preserve the baseline blood sample for at least 90 days; if the exposed employee elects to have the baseline sample tested during this waiting period, perform testing as soon as feasible.

d. Administration of Post-Exposure Evaluation and Follow-Up.

- i. [John Hunter, EMS Coordinator,] will ensure that health care professional(s) responsible for employee's hepatitis B vaccination and post-exposure evaluation and follow-up are given a copy of OSHA's blood-borne pathogens standard.
  - 1. The exposed employee's supervisor will collect the following information and provide it to [Mr. Hunter] who will ensure that it is provided to the health care professional evaluating an employee after an exposure incident:
    - a. A description of the employee's job duties relevant to the exposure incident.
    - b. Route(s) of exposure circumstances of exposure.
    - c. If possible, results of the source individual's blood test relevant to employee medical records, including vaccination status.
    - d. Within 15 days following the evaluation, [Mr. Hunter] will provide the employee with a copy of the evaluating health care professional's written.

e. Exposure Incident Evaluation Procedures.

- i. The employee's supervisor and [Mr. Hunter], will review the circumstances of all exposure incidents to determine:
  - 1. Engineering controls in use at the time.
  - 2. Work practices followed.
  - 3. A description of the device being used (including type and brand.)
  - 4. Protective equipment or clothing that was used at the time of the exposure incident (gloves, eye shields, etc.).
  - 5. Location of the incident (O.R., E.R., patient room, etc.).
  - 6. Procedure being performed when the incident occurred.
  - 7. Employee's training.
- i. [Edward Miller, Safety Officer,] will record all percutaneous injuries from contaminated sharps in the Sharps Injury Log.
- ii. If it is determined that revisions need to be made, [Mr. Miller] will ensure that appropriate changes are made to this ECP. (Changes may include an evaluation of safer devices, adding employees to the exposure determination list, etc.)

#### 6. Employee Information and Training

- a. Employees covered by the bloodborne pathogens standard receive an explanation of this ECP during their initial training session. It will also be reviewed in their annual refresher training. All employees will have an opportunity to review this plan at any time during their work shifts by contacting their supervisor. Copies will be provided on request.
- b. All employees who have occupational exposure to bloodborne pathogens receive training conducted by [Edward Hunter, Safety Officer. Mr. Hunter has completed the FOH Bloodborne Pathogens train the trainer course].
- c. All employees who have occupational exposure to bloodborne pathogens will receive training on the epidemiology, symptoms and transmission of bloodborne pathogen diseases. In addition, the training program covers, at a minimum, the following elements:
  - i. A copy and explanation of the standard.
  - ii. An explanation of our ECP and how to obtain a copy.
  - iii. An explanation of methods to recognize tasks and other activities that may involve exposure to blood and OPIM, including what constitutes an exposure incident.

- iv. An explanation of the use and limitations of engineering controls, work practices, and PPE.
  - v. An explanation of the types, uses, location, removal, handling, decontamination and disposal of PPE.
  - vi. An explanation of the basis for PPE selection.
  - vii. Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated and that the vaccine will be offered free of charge.
  - viii. Information on the appropriate actions to take and persons to contact in an emergency involving blood or OPIM.
  - ix. An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
  - x. Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident.
  - xi. An explanation of the signs and labels and/or color coding required by the standard and used at this facility.
  - xii. An opportunity for interactive questions and answers with the person conducting the training session.
- d. Training materials for this facility are available at the Safety Office.

## 7. Record-keeping

- a. Training Records.
  - i. Training records are completed for each employee upon completion of training. These documents will be kept for at least three years at the Safety Office. The training records will include:
    - 1. The dates of the training sessions.
    - 2. The contents or a summary of the training sessions.
    - 3. The names and qualifications of persons conducting the training.
    - 4. The names and job titles of all persons attending the training sessions.

- ii. Employee training records are provided upon request to the employee or the employee's authorized representative within 15 working days. Such requests should be addressed to the safety officer.

b. Medical Records

- iii. Medical records are maintained for each employee with occupational exposure in accordance with 29 CFR 1910.1020, "Access to Employee Exposure and Medical Records."
- iv. The personnel office is responsible for maintenance of the required medical records. These confidential records are kept at the personnel office for at least the duration of employment plus 30 years.
- v. Employee medical records are provided upon request of the employee or to anyone having written consent of the employee within 15 working days. Such requests should be sent to [your park] Personnel Office.

c. OSHA Record-keeping

- vi. An exposure incident is evaluated to determine if the case meets OSHA's Record-keeping Requirements (29 CFR 1904). This determination and the recording activities are done by the Safety Officer.
- vii. Sharps Injury Log.
  - 1. In addition to the 1904 Record-keeping Requirements, all percutaneous injuries from contaminated sharps are also recorded in the Sharps Injury Log. All incidences must include at least:
    - a. The date of the injury.
    - b. The type and brand of the device involved.
    - c. The department or work area where the incident occurred.
    - d. An explanation of how the incident occurred.
  - 2. This log is reviewed at least annually as part of the annual evaluation of the program and is maintained for at least five years following the end of the calendar year that they cover. If a copy is requested by anyone, it must have any personal identifiers removed from the report.

## 4.7 INFECTIOUS DISEASE CONTROL

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RESERVED

## **4.8 ASBESTOS EXPOSURE CONTROL**

### **National Park Service Policy for Asbestos Exposure Control**

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Parks will establish a comprehensive asbestos management and exposure control program designed to protect employees, volunteers and the public, including all building occupants from unacceptable exposure to airborne asbestos. The asbestos exposure control program will provide for compliance with all applicable federal, state and local regulations.

#### **References**

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1. 29 CFR 1910.1001. Asbestos in General Industry
2. 29 CFR 1926.1101. Asbestos in Construction
3. 29 CFR 1910.1200, Hazard Communication
4. 40 CFR 61.56 National Emission Standards for Hazardous Air Pollutants (NESHAPS)
5. 40 CFR 61.154 Standard for Active Waste Disposal Sites
6. 40 CFR 763. Asbestos Hazard Emergency Response Act.
7. ASTM 1368-99, Standard Practice for Visual Inspection of Asbestos Abatement Projects
8. Sheehy, J.W., T.C. Cooper, D.M. O'Brien, J.D. McGlothlin, and P.A. Froehlich. 1989. Control of Asbestos Exposure During Brake Drum Service. NIOSH Pub 89-121.
9. NPS-36 Government Furnished Housing Management Guideline 10.NPS 76 Housing Design and Rehabilitation Guideline.
10. NPS. Health Hazards of Asbestos, Lead, and Radon Gas in National Park Service Housing, Interim issue, July 25 1997
11. NIH pub 89-1647. 1989. How to Quit Smoking—And Quit for Keeps

#### **Scope**

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This section applies to all users of asbestos and all facilities owned or managed by the park. Requirements are intended to provide protection of employee and volunteers from all unacceptable occupational exposure; of occupants of NPS-owned or managed facilities; and of occupants of housing.

## Exposure Limits

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*Permissible Exposure Limit (PEL).* Unprotected workers shall not be exposed to airborne asbestos fiber concentrations greater than 0.1 fiber per cubic centimeter (0.1 f/cc) as an eight-hour time-weighted average (TWA).

*Excursion Limit.* Workers shall not be exposed to asbestos concentrations in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) averaged over a sampling period of 30 minutes.

*Non-Occupational Exposure Limit.* Ambient concentrations of asbestos in air in occupied spaces will not exceed 0.01 f/cc. The non-occupational exposure limit will apply to employees or occupants of facilities and spaces not engaged in asbestos work.

## Definitions

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*Asbestos-Containing Material (ACM)* is any material containing more than one percent asbestos. The type and percentage of asbestos in a material must be determined by laboratory analysis<sup>1</sup>. Note that some states and local jurisdictions regulate asbestos even when it occurs at levels less than 1% in products.

*Presumed Asbestos-Containing Material (PACM)* is any thermal system insulation or surfacing material that has been sprayed or trowelled on for which sampling and laboratory analysis is not available.

*Suspected Asbestos-Containing Material* is any building material including thermal system insulation or miscellaneous material, but excluding metal, wood, fibrous glass or neoprene, found in the interior of structures installed prior to 1980.

*Friable Asbestos* is ACM or PACM, which may be crumbled or reduced to powder by hand pressure. Friable ACM or PACM is more likely to release asbestos fibers and so it is more hazardous than non-friable ACM or PACM.

*Regulated Asbestos Containing Material (RACM)* is ACM that is subject to regulation under 40 CFR 61.154 NESHAP. The following types of ACM are considered RACM; (a) friable ACM, (b) any packing, gasket, resilient floor covering or asphalt roofing ACM product (category I non-friable ACM under NESHAP) that has either become friable or that will be, or has been, subjected to sanding, grinding, cutting or abrading; and (c) any other non-friable ACM (Category II) that has a high probability of becoming, or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

<sup>1</sup>PLM analysis as described in Appendix A of 40 CFR 763, NIOSH Method 9002, or OSHA I-191

*Class I Asbestos Work* means an activity involving the removal of Thermal System Insulation (TSI) and surfacing ACM and PACM.

*Class II Asbestos Work* means activities involving the removal of ACM, which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

*Class III Asbestos Work* means repair and maintenance operations, where “ACM,” including TSI and surfacing ACM and PACM, is likely to be disturbed.

*Class IV Asbestos Work* means maintenance and custodial activities during which employees contact, but do not disturb ACM or PACM, and activities to clean up dust, waste and debris resulting from Class I, II and III activities.

*Regulated Areas* are those areas where Class I, II and III asbestos work is conducted; any area where debris and waste from such work accumulates; and, work areas where the fiber concentration may exceed the permissible exposure limit (PEL) of 0.1 fibers per cubic centimeter (f/cc). Regulated areas are used to control access to and from operations where asbestos work is being conducted or other areas where an asbestos hazard exists.

*Competent Person* means a person who is capable of identifying existing asbestos hazards in the workplace, selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures to eliminate them. In addition, for Class I and Class II work, it means a person who is specially trained in a training course that meets the criteria of EPA’s Model Accreditation Plan (40 CFR 763) for supervisor or its equivalent. For Class III and Class IV work, it means a person who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).

## **Program Elements**

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*Managing Asbestos-Containing Materials.* Intact and undisturbed asbestos materials do not pose a health risk. The mere presence of asbestos in a building does not mean that the health of the occupants is endangered. When asbestos-containing material (ACM) is in good condition and is properly managed, the risk of asbestos-related disease is minimal. However, when ACM is damaged, cut, sanded or deteriorates, it may release asbestos fibers into the air and become hazardous. In order to ensure that asbestos does not become hazardous, asbestos sources must be identified and either managed in place or removed from the workplace or occupied environment. To accomplish this requires planning, periodic site review, management of contracts, proper disposal following removal and recordkeeping.

1. *Use of Asbestos.* All new installation of asbestos-containing material is prohibited, except where there is no satisfactory substitute.
2. *Identifying Asbestos Containing Materials.* The park will identify ACM and PACM in all facilities that it manages. The basis for determining the presence or absence of asbestos in park facilities will be either by:
  - a. *Completed comprehensive inspections.* Comprehensive building inspections must be performed by an EPA/AHERA-accredited inspector according to the protocols set forth in 40 CFR 763. Form 1. *Asbestos Inspection* (see Appendix A) reflects the information that must be captured during an asbestos inspection. Unless an inspection is conducted for demolition of a building or major renovation, the inspection is not expected to utilize destructive techniques to obtain samples from materials that are otherwise not accessible. However, areas or material not sampled should be identified in the inspection report. All suspect materials that are not sampled should be identified as PACM. Comprehensive inspections should also include written recommendations regarding the presence of any friable damaged or significantly damaged ACM.
  - b. *Limited sampling.* Bulk sampling must be conducted by an EPA/AHERA-accredited inspector. Samples must be analyzed by a laboratory accredited by the National Voluntary Laboratory Accreditation Program. Data from limited sampling of suspect materials shall be tracked through completion of the Form 2 Asbestos Bulk Sampling (see Appendix A) or an equivalent data recording mechanism. The exact sample location must be labeled with a traceable identification number at the time of collection.
  - c. *The year the facility was built.* Facilities built before 1980 with no sampling records will be listed in the inventory to contain PACM. Those built after 1980 will be assumed to be asbestos-free, although future sampling may be conducted to validate this presumption. Facilities with abatement records or documentation through contracts or building specifications indicating materials are free of asbestos will not require further sampling.
3. *Inventory of ACM and PACM.* The park will develop and maintain an inventory of all identified ACM and PACM for all park managed facilities. An inventory of ACM at each park allows managers to systematically plan and execute asbestos management and exposure controls rather than engage in crisis management once ACM is discovered — frequently coincident with an uncontrolled fiber release incident. The inventory eliminates repeated analysis of suspected or presumed materials. Inventories will include the following information: a unique facility identifier, the year the facility was built, the presence and location of ACM or PACM, its condition and potential for damage, and the priority order in which comprehensive asbestos surveys or further (bulk) sampling should be conducted.

4. **Asbestos Management Plan.** Each park will implement an Asbestos Management Plan<sup>2</sup> if ACM or PACM is identified in park-managed facilities. The plan will describe the park's systematic and risk-prioritized procedures for managing asbestos. Park Asbestos Management Plans will include the following:
  - a. Designation of a Park Asbestos Exposure Control Coordinator (PAECC) responsible for coordinating the implementation of the Park Asbestos Management Plan.
  - b. Methods for developing and maintaining an inventory of ACM and PACM.
  - c. Labeling and hazard communication procedures.
  - d. Inspection procedures.
  - e. Work practice controls and worker procedures to be used during maintenance activities, repair, removal and disposal that may disturb ACM.
  - f. Procedures for response to uncontrolled fiber release episodes.
  - g. Waste disposal procedures.
5. ***Notification and Labeling.*** Informed persons are less likely to unknowingly disturb ACM and cause the release of fibers into the air. The park shall use a combination of the following methods to notify employees, contractors or building occupants of the presence of ACM/PACM:
  - a. Annual asbestos awareness training will be provided to all employees. Training will cover what asbestos is; its common uses and materials in which it is found; human health hazards associated with exposure; facilities where it is located; how to recognize and report damage and deterioration; how to avoid damaging it; and how the park is managing asbestos in its facilities.
  - b. The asbestos inventory will provide current information on the exact location of ACM or PACM identified in park facilities and will be the primary resource for notification information to be used by maintenance personnel who conduct or initiate work that may impact ACM or PACM. Those individuals must consult the inventory to ensure that appropriate worker notification is accomplished. Contract projects must include specifications to address work that will impact ACM or PACM.

<sup>2</sup>Often referred to as an Operations and Maintenance (O&M) Plan.

- c. A notification letter will be provided to each housing resident or head of household prior to occupancy to identify the presence, location and condition of ACM or PACM. An EPA informational pamphlet entitled *Asbestos in the Home, A Homeowner's Guide*, describing the health concerns, materials that may contain asbestos, how to avoid disturbing asbestos, and what to do if asbestos is damaged, will be provided with the notification letter.
- d. All identified ACM in non-housing facilities or non-occupied spaces of housing facilities will be labeled to provide additional notification and warning as follows:

DANGER:  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD

Any ACM newly identified by a comprehensive asbestos survey or sampling, shall be promptly labeled.

- 6. *Annual Surveillance.* Visual surveillance of all identified ACM and PACM in the park inventory will be conducted annually to determine changes in condition. Damaged suspect materials must either be sampled to confirm the presence of asbestos or repaired as PACM. Inspections should confirm that ACM has been properly labeled, identify ACM or PACM that has been damaged and the extent of damage, indicate the suspected source of any damage or potential for damage, note whether any ACM/PACM dust or debris is present, and determine friability. Inspections will be documented on Form 3 *Asbestos Surveillance* (see Appendix A) or equivalent. Personnel conducting surveillance activities shall be AHERA-accredited inspectors or trained by an AHERA-accredited inspector to evaluate the condition of ACM/PACM. The inventory will be updated to reflect any changes noted. Appropriate follow-up action will be taken to control observed potential exposure posed by the ACM or PACM.
- 7. *Response Actions.* Whenever ACM or PACM is damaged, actions will be taken to repair the damage and control the release of fibers. Table 1 provides recommended guidelines for routine response actions to be implemented whenever friable ACM is identified.

**Table 1: Table of Recommended Response Actions for Friable Asbestos Containing Material**

PHYSICAL ASSESSMENT	RECOMMENDED RESPONSE ACTION
Damaged or Significantly Damaged TSI	Clean up asbestos dust or debris and remove or repair as soon as possible
Damaged friable surfacing or misc. material	Clean up asbestos dust or debris and repair, encapsulate, enclose or remove
Significantly Damaged friable surfacing or misc. material	Immediately isolate if necessary to protect human health and environment, and/or remove, enclose or encapsulate
Friable TSI, surfacing or misc. material w/ Potential for Damage	Implement preventive measures if in high frequency/occupancy areas, continue to monitor according to asbestos management plan
Friable TSI, surfacing or misc. material w/ potential for significant damage	Implement preventive measures if in high frequency/occupancy areas and increase surveillance; or repair, encapsulate or enclose if feasible; or remove

#### TSI – Thermal System Insulation

Damaged – Damage over <10% of area or <25% if localized (surfacing & misc. material); missing jackets on <10% of TSI or <10% evenly distributed damage, <25% if localized.

Significantly Damaged - Damaged over >10% of area, >25% if localized); missing jackets on >10% of TSI or >10% evenly distributed damage, >25% if localized  
Potential for Damage – Potential for Damage, based on moderately frequented area, moderate vibration impact or moderate air erosion

Potential for Significant Damage – Potential for Significant Damage, based on highly frequented area, high vibration impact or high air erosion

- a. Response actions for friable ACM may be conducted by Class III maintenance workers provided that it involves small-scale, short-duration maintenance activities, as described by EPA in 40 CFR 763. Satisfactory completion of response actions involving small-scale, short-duration maintenance activities can be determined by a thorough visual inspection.
- b. Responses other than small-scale, short-duration maintenance activities must be designed by an AHERA accredited Project Designer and conducted by AHERA accredited abatement workers. Satisfactory completion of the work must be determined by visual inspection and environmental air sampling (see program element 15, Project Completion and Clearance).

\*Small-scale, short-duration means maintenance activities which involve removal of less than 3 ft<sup>2</sup> of surfacing ACM or 3 linear feet of TSI, or that will require less than one day to complete.

## 8. *Fiber Release Episodes*

As long as ACM is present there remains the potential for a fiber release. Therefore procedures must be outlined to address any unintentional or uncontrolled releases. Any disturbance of friable ACM must be reported to the PAECC for initial evaluation and action. Access to the area must be prohibited until an estimate of the extent of contamination can be made. It is recommended that air sampling be conducted in and around the affected area for asbestos fibers as soon as practicable.

Special procedures are generally needed to minimize the spread of fibers throughout the building after an asbestos fiber release occurs, such as the partial collapse of an ACM ceiling or wall, accidental disturbance of ACM or a large breach in a containment barrier for a maintenance or abatement project. Under AHERA regulations, a major fiber release is defined as one involving more than three square feet or three linear feet of ACM. The procedures followed will vary according to the amount of ACM affected, the extent of fiber release, the relationship of the release area to the air handling systems, and whether the release site is accessible to building occupants.

In general, for major fiber releases, wet the ACM and isolate the area by closing doors and erecting temporary barriers to restrict airflow. Restrict access to the site to prevent persons not involved in the clean-up operation from inadvertently entering the area. If asbestos fibers could enter the ventilation system, shut down the supply and return-air to the affected area and seal off the system to prevent fiber entry. The final steps will include a thorough cleanup, a careful inspection and final clearance air monitoring to verify satisfactory cleanup. Response actions for any major release episode must be developed by an AHERA-accredited Project Designer. Depending on the quantity of regulated asbestos-containing material (RACM), EPA notification may be required (40 CFR 61, NESHAP).

Minor fiber release episodes, which involve less than three square feet or three linear feet of ACM, can be addressed by standard wet cleaning and HEPA filter vacuuming techniques. Although an accredited Project Designer is not required to design the response plan, the cleanup must be conducted by properly trained personnel following appropriate safe work practices.

*Asbestos Repair, Removal, Abatement.* Whenever it is necessary to repair, remove, abate or otherwise disturb asbestos, safe work practices and personal protective equipment must be used to minimize asbestos exposure to workers, occupants of buildings and the public. Repair, removal and abatement of asbestos shall be conducted in accordance with the requirements of 29 CFR 1926.1101, applicable federal, state and local regulations, and the requirements set forth here.

9. *Locate ACM.* Prior to initiation of maintenance, repair, remodeling, renovation or demolition activities, ACM will be located by referencing the park's ACM/PACM inventory. Suspect materials not included on the inventory will either be sampled to determine asbestos content or will be presumed to contain asbestos for purposes of determining worker protection and compliance requirements.
10. *Authorized Workers.* Asbestos repair, removal and abatement shall be conducted only by workers who have received the appropriate level of EPA/AHERA-accredited training (see Table 2 in Section C, Training).
11. *Exposure assessment.* Representative eight-hour TWA employee exposure shall be determined on the basis of one or more samples representing full-shift exposure for employees in each work area. Representative 30-minute, short-term employee exposures shall be determined for those operations most likely to produce exposures above the excursion limit for employees in each work area. Details for exposure assessment requirements are found in Appendix B.
12. *Regulated Areas.* Regulated areas will be established whenever Class I, II or III asbestos work is being conducted to control access to the work site or hazard area. Regulated areas will be demarcated using barriers or barricades, critical barriers, or negative pressure enclosures. They must be labeled with the following warning:

DANGER  
ASBESTOS  
CANCER AND LUNG DISEASE HAZARD  
AUTHORIZED PERSONNEL ONLY  
RESPIRATORS AND PROTECTIVE CLOTHING  
ARE REQUIRED IN THIS AREA

13. *Competent Person.* Parks will ensure that all asbestos work performed within regulated areas is supervised by a competent person. See Appendix C for competent person roles and responsibilities.
14. *Exposure Control.*
  - a. *Engineering and Work Practice Controls.* All general and work class-specific requirements and prohibitions of 29 CFR 1926.1101 will be followed when conducting asbestos work.
  - b. *Respiratory Protection.* All persons entering a regulated area where employees are required to wear a respirator shall be supplied with the appropriate respirator, which will be used in accordance with the requirements of Section 4.3, Respiratory Protection. Respirator use is required during the following work conditions:

- Class I asbestos work.
- Class II asbestos work when ACM is not substantially intact.
- Class II and Class III work when not using wet methods or when no negative exposure assessment has been conducted.
- Class III when thermal system insulation or surfacing ACM or PACM is being disturbed.
- Class IV when performed in regulated areas.
- Any operation that may expose an employee above the PEL or excursion limit.

#### 15. *Project Completion and Clearance.*

A clearance inspection will be conducted at the completion of all asbestos jobs. At a minimum, clearance will consist of a visual inspection following guidance provided in ASTM 1368-99, *Standard Practice for Visual Inspection of Asbestos Abatement Projects*. Environmental sampling is not necessary for clearance of small-scale, short-duration projects for response to minor release episodes or for maintenance and repair operations (class III work). For all other asbestos work, environmental sampling must be included in clearance.

Phase Contrast Microscopy (PCM) (NIOSH Method 4700) may be used for environmental sample analysis for routine clearance. Transmission Electron Microscopy (TEM) (NIOSH Method 4702) should be used to analyze suspicious PCM results and for large, complex projects. Aggressive sampling techniques will be used for clearance of projects conducted in negative pressure enclosures. Environmental sampling for PCM and TEM methods will follow the methods presented in 40 CFR 763 (AHERA).

#### 16. *Medical Surveillance.*

Parks must provide medical surveillance for all employees engaged in Class I, II and III work who are exposed at or above the permissible exposure limit for a combined total of 30 or more days per year. Workers that conduct only Class II or Class III operations on intact material following required exposure control practices for one hour or less, including cleanup, are not included.

In addition, medical clearance is required for those employees required to wear a negative pressure respirator (refer to Section 4.3, Respiratory protection).

Required medical examinations must be performed by or under the supervision of a licensed physician, and are provided at no cost to the employee at a reasonable time and place.

17. *Environmental Protection and Notification.* Facilities with ACM/PACM that are scheduled for demolition or significant renovation, must first be evaluated to determine the existence and quantity of regulated asbestos-containing material (RACM). For those facilities containing RACM, EPA notification is required and, depending on the quantity of RACM, it may be subject to specific emission control procedures. Refer to NPS Environmental Management Program guidance for environmental protection and notification requirements.
18. *Asbestos Waste Shipping and Disposal.* Materials contaminated with asbestos that cannot be decontaminated, are considered asbestos-containing waste and must be properly disposed. This may include furniture, equipment and PPE, in addition to construction materials. All asbestos-containing waste materials required to be removed during renovation or prior to or following demolition must be handled, shipped and disposed in accordance with federal, state and local regulations. Refer to NPS Environmental Management Program guidance for asbestos waste disposal requirements.

*Information and Training.* Information and training are key to hazard recognition and to appropriate decision-making regarding asbestos management and protection of workers, occupants and the public. Training requirements vary with responsibility and activity.

19. Worker Training.

Training is essential to the success of the park's Asbestos Exposure Control Program. Training provides a background on asbestos uses and health hazards, asbestos regulations, respiratory and other personal protection equipment, and key concepts of asbestos hazard control presented in this Asbestos Management Plan. Workers and building occupants who are trained and informed are at greatly reduced risk of exposure to asbestos fiber release due to improper work practices.

All custodial and maintenance workers, abatement workers and contractors, or other persons involved in asbestos-related activities must receive training if they have the potential to disturb ACM, enter an asbestos regulated area or perform ACM-related activities. Table 2 lists the training requirements for each type of asbestos operation.

20. *Smoking Cessation.* Parks will provide smoking cessation material to asbestos workers on request. At a minimum, provide employees a copy of National Institutes of Health publication *How to Quit Smoking — And Quit for Keeps*, NIH pub 89-1647. It is recommended that additional smoking cessation programs, such as that available through the American Lung Association, [www.lungusa.org/tobacco/quitting\\_smoke.html](http://www.lungusa.org/tobacco/quitting_smoke.html), be made available.

TYPE OPERATION	TYPE PERSONNEL	TYPE ACCREDITATION REQUIRED	INITIAL TRAINING REQUIREMENT	ANNUAL RECERT OR REFRESHER & LENGTH	REGULATORY CITATION
Design of projects which involve removal of acm or work in proximity of acm/pacm	Architects, engineers, planners, estimators(p&e's)	Abatement project designer	3 Day asbestos project designer course	Yes1 day	• 40 CFR 763.92
Review of projects to determine adequacy of control	Engineers, industrial hygienists, safety personnel	Abatement project designer	3 day abatement project designer course	Yes1 day	• 40 CFR 763.92
Person responsible for asbestos removal, encapsulation, enclosure and/or repair (class I and II asbestos work)	Asbestos abatement supervisor or competent person, qualified person, roicc personnel	Asbestos abatement contractor/supervisor	5 day asbestos abatement contractor/supervisor course	Yes1 day	29 CFR1926.1101(o)(4)(i)• 40 CFR 763.92• 40 CFR 61 Subpart M
Person responsible for maintenance and housekeeping (class III and IV asbestos work)	Maintenance and housekeeping supervisors, competent, qualified person	None	16 hour operations and maintenance course	Yes Not specified	29 CFR1926.1101(o)(4)(ii)
Physical gathering of suspected acm/pacm samples for lab analysis	Safety personnel industrial hygienist, p&e's, & facility inspectors	Asbestos inspector	3 Day asbestos inspector course	Yes1/2 day	29 CFR 1926.1101(k)(5) • 40 CFR 763.92

Development of asbestos management plans & asbestos O&M plans	Facility inspectors, safety personnel & industrial hygienist	Asbestos management planner	2 day asbestos management planner course (Inspector accreditation required as prerequisite)	Yes 1/2 day	• 40 CFR 763.92
Laboratory analysis of airborne sample	Industrial hygiene, safety, laboratory personnel	Proficiency analytical testing (pat) rounds	5 day Niosh 582 course or equivalent	Yes (Pat)	29 CFR 1910.1001 APP. A 29 CFR 1926.1101 APP. A
Personnel who engage in class I or class II work that requires critical barriers or negative pressure enclosures	Abatement workers	asbestos abatement workers	4 day asbestos abatement worker course; or 5 day asbestos abatement contractor/supervisor course	Yes 1 day	29 CFR 1926.1101(k)(9) • 40 CFR 763.92

**Table 2: Asbestos Training And Certification Requirements Listed By Type Of Operation**

TYPE OPERATION	TYPE PERSONNEL	TYPE ACCREDITATION REQUIRED	INITIAL TRAINING REQUIREMENT	ANNUAL RECERT OR REFRESHER & LENGTH	REGULATORY CITATION
Personnel who engage in class ii work involving roofing, flooring, siding material, ceiling tiles, or tran site pannels removed substantially intact	Abatement workers	None	8-hour asbestos course, including hands-on training	Yes Not specified	29 CFR 1926.1101(k)(9)
Personnel who engage in class III operations only	Maintenance workers	None	16-hour operations & maintenance course. Requirements are relaxed when only one generic category of building material in class IIIi work is done.	Yes Not specified	29 CFR 1926.1101(k)(9)• 40 CFR 763.92(a)(2)
Personnel who engage in class iv operations only and housekeeping where acm or pacm is present	Maintenance & custodial workers	None	2-hour asbestos awareness course	Yes 2 hours	29 CFR 1910.1001(j)(7) 29 CFR 1926.1101(k)(9)• 40 CFR 763.92(a)(1)
Responsible for overall asbestos program at unit	Asbestos exposure control program coordinator	Letter of designation from park superintendant	2-hour asbestos awareness course. familiarity with the asbestos management plan.	Yes 2 hour	Recommended training
Air sampling	Asbestos workplace monitors and clearance samplers	None	2-days and on the job training	None	Recommended training
Automotive brake and clutch	Auto mechanics	None	2-hour awareness plus hands-on training	None	29 CFR 1910.1001(j)(7) 29 CFR 1915.1001 APP. L
General industries operations above pel (not otherwise classified)	Various	None	2-hour awareness and operation specific	Yes Not specified	29 CFR 1910.1001(j)(7)

\*Training and certification requirements apply to all persons performing asbestos-related work as workers, supervisors, inspectors or project designers working in public and commercial buildings (which includes all park-owned and operated buildings)

## 21. *Record-Keeping.*

*Record-Keeping.* Failure to collect and maintain accurate and complete records of asbestos-containing material identifications, management activities and exposure evaluations can lead to duplication of costly data-gathering efforts, unnecessary procedures, fiber release and contamination events, unacceptable personal exposure, and legal liability — all of which are avoidable.

Record-keeping is an important part of effective asbestos management. The park's inventory of ACM/PACM may be effectively updated and accessed by using an electronic format such as a database. However, hard copy files must be maintained to provide an historical record of sampling, asbestos-related facility activities, annual surveillance and worker/occupant training.

The Park will maintain asbestos-related files on each structure containing ACM or PACM. These files will contain the following records:

- a. Asbestos abatement or maintenance activities records, including documents/data related to ACM/PACM repair or removal (small-scale, short-duration or abatement); cleanup records or clearance sampling associated with asbestos repair, removal or fiber release episodes; ACM disposal records; and EPA notification for demolition/renovation. These records will be retained for as long as the park retains ownership of the facility.
- b. Bulk sampling, including any comprehensive asbestos inspections, data from limited sampling or data used to demonstrate that PACM is not asbestos-containing. These records will be retained for as long as they are relied upon to determine the existence of asbestos or rebut the presumption of ACM. All written records providing information on the identification, location and quantity of ACM and PACM, shall be maintained by the park for the duration of ownership and shall be transferred to successive owners of such buildings or facilities.
- c. Annual surveillance, including documentation of annual facility inspections conducted to determine the condition of existing ACM/PACM. These records will be retained for as long as the park retains ownership of the facility.
- d. Worker and occupant training and notification, including the records of awareness training and disclosure notices provided to building occupants. Training records or certifications of personnel contracted to conduct comprehensive inspections and abatement or cleanup activities for that specific facility will also be kept. These records will be retained for as long as the park retains ownership of the facility. Records of required notification of the identification and quantity of ACM and PACM shall be transferred to successive owners.

The following asbestos worker exposure related records will be maintained:

- a. Objective data used to demonstrate that worker exposures will not exceed the PEL or excursion limit (negative exposure assessment data). These records will be retained for the duration of employment plus one year.
- b. Personal exposure monitoring data will be maintained for the duration of employment plus one year.
- c. Medical surveillance records will be maintained for the duration of employment plus 30 years.
- d. All employee-training records. These records will be maintained for duration of employment plus one year.

## **Appendix A: Forms**

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Form 1. Asbestos Inspection

Form 2. Asbestos Bulk Sampling

Form 3. Asbestos Surveillance

Form 4. Asbestos Repair or Removal Tracking

## Form 1. Asbestos Inspection

Building:

Inspector:

Date:

LOCATION <sub>1</sub>		MATERIAL CHARACTERIZATION				PHYSICAL ASSESSMENT <sub>2</sub>		SAMPLING		
Homogen Area No	Functional Space No	Mat. Type	Description	Friable	Material Quantity	Condition	Potent For Disturb	Sample ID	Sample Location Description	Analysis Results
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			
		TSI Surf. Misc.		Yes No NA		SD D G	SD D L			

1 Homogenous Areas and Functional Space defined by AHERA 2 Physical Assessment Descriptors are as defined by AHERA 3 Indicate type and percent of asbestos Condition Designations: SD = Significant Damage; D = Damaged; G = Good Potential for Disturbance Designations: SD = Significant Potential for Damage; D = Potential for Damage; L = Low Potential for Damage

## Form 2. Asbestos Bulk Sample

\*\*\*ATTACH LABORATORY ANALYTICAL SAMPLE RESULTS and Forward this form to the Park Asbestos Exposure Control Coordinator\*\*\*

COLLECTION DATA			
Sample No:	Inspector:		Sample Date:
Bldg No:	Floor:	Room:	Other:
Sample Details: (e.g., floor tile mastic near window, piping insulation along south wall, etc.)			
Estimated Quantity: (i.e., LF or SF similar material)		Condition: Friable <input type="checkbox"/> Yes <input type="checkbox"/> No Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/>	

COLLECTION DATA			
Sample No:	Inspector:		Sample Date:
Bldg No:	Floor:	Room:	Other:
Sample Details: (e.g., floor tile mastic near window, piping insulation along south wall, etc.)			
Estimated Quantity: (i.e., LF or SF similar material)		Condition: Friable <input type="checkbox"/> Yes <input type="checkbox"/> No Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/>	

COLLECTION DATA			
Sample No:	Inspector:		Sample Date:
Bldg No:	Floor:	Room:	Other:
Sample Details: (e.g., floor tile mastic near window, piping insulation along south wall, etc.)			
Estimated Quantity: (i.e., LF or SF similar material)		Condition: Friable <input type="checkbox"/> Yes <input type="checkbox"/> No Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/>	

### Form 3. Asbestos Surveillance

Step 1 – Use a current Asbestos Inventory to guide you through the survey.

Step 2 – Inspect all material listed in the Asbestos Inventory as ACM for labels. Label if missing.

Step 3 – If any ACM is friable, check column 1 and evaluate for potential for disturbance.

Step 4 – Evaluate for potential for disturbance based on the following Matrix and note in column 2:

	EXAMPLES OF POTENTIAL FOR CONTACT	EXAMPLES OF VIBRATION INFLUENCE	EXAMPLES OF POTENTIAL FOR AIR EROSION
High	Working near > once/week or public area, like a hallway, reception area, or dining area	Loud engines present or vibrations from aircraft easily sensed	High velocity air, like an elevator shaft or fan room
Moderate	Working near once/month to once/week or occupied room or office	Engines/motors present, but vibrations not very obvious or occasional loud sounds	Noticeable air movement, like an air shaft or ventilator air stream
Low	Working near < once/month or material is visible but not within reach of occupants	None of the above	None of the above

Step 5 – Describe any damaged ACM (e.g., punctured TSI, water damaged ceiling tiles, delaminating surfacing material, etc.).

Step 6 – Indicate any suspected sources/causes of the damaged asbestos (e.g., ladders propped on TSI, leaking roof, weathered/aged surfacing material).

Step 7 – Check column if ACM dust or debris is evident beneath/near the damaged material.

Step 8 – Indicate the room where friable or damaged material is located.

Building:

Inspector:

Date:

FRIABLE	POTENT FOR DISTURB	DESCRIPTION OF DAMAGED ACM/PACM	SUSPECTED SOURCE OF DAMAGE	DUST OR DEBRIS	ROOM

## Form 4. Asbestos Repair/Removal Tracking Form

\*\*\*Forward this form to the Park Asbestos Exposure Control Coordinator\*\*\*

TRACKING DATA		
<b>Activity:</b> <input type="checkbox"/> ACM/PACM Removal <input type="checkbox"/> ACM Repair <input type="checkbox"/> PACM Repair	<b>Type of Material:</b> <input type="checkbox"/> TSI <input type="checkbox"/> Surfacing Material <input type="checkbox"/> Miscellaneous Material	<b>Estimated Quantity (LF or SF):</b>
Description of material and location within the room:		
Building:	Floor:	Room:
Complete abatement of the material in this room <input type="checkbox"/> was <input type="checkbox"/> was not conducted.		
Company name and person conducting activity:		Date of activity:

TRACKING DATA		
<b>Activity:</b> <input type="checkbox"/> ACM/PACM Removal <input type="checkbox"/> ACM Repair <input type="checkbox"/> PACM Repair	<b>Type of Material:</b> <input type="checkbox"/> TSI <input type="checkbox"/> Surfacing Material <input type="checkbox"/> Miscellaneous Material	<b>Estimated Quantity (LF or SF):</b>
Description of material and location within the room:		
Building:	Floor:	Room:
Complete abatement of the material in this room <input type="checkbox"/> was <input type="checkbox"/> was not conducted.		
Company name and person conducting activity:		Date of activity:

TRACKING DATA		
<b>Activity:</b> <input type="checkbox"/> ACM/PACM Removal <input type="checkbox"/> ACM Repair <input type="checkbox"/> PACM Repair	<b>Type of Material:</b> <input type="checkbox"/> TSI <input type="checkbox"/> Surfacing Material <input type="checkbox"/> Miscellaneous Material	<b>Estimated Quantity (LF or SF):</b>
Description of material and location within the room:		
Building:	Floor:	Room:
Complete abatement of the material in this room <input type="checkbox"/> was <input type="checkbox"/> was not conducted.		
Company name and person conducting activity:		Date of activity:

## **Appendix B: Exposure Assessment**

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### **Initial Exposure Assessment**

Prior to beginning asbestos work, an initial exposure assessment must be completed. The initial assessment is based on available monitoring results, observations and information about the materials, processes and potential for fiber release, which can indicate exposure representative of the work at hand. Initial exposure assessment may be made by a trained and experienced competent person.

All class I asbestos work will be presumed to create conditions that will exceed the PEL and excursion limit until personal exposure monitoring or a negative exposure assessment is made.

### **Negative Exposure Assessment**

A negative exposure assessment is a demonstration that the employee will not be exposed to asbestos at or above the PEL or excursion limit. Data used to determine a negative exposure are:

1. Objective data demonstrating that the material cannot release fibers in excess of the PEL or excursion limit under the worst case working conditions that could be experience during the job.
2. Prior monitoring data collected within the past 12 months for work conditions that closely resemble the process, type of material being disturbed, work practices and exposure control methods, environmental conditions and level of employee training.
3. Results of initial personal exposure monitoring of the current job.

### **Initial Personal Exposure Monitoring**

In the absence of sufficient data to make a negative exposure assessment, initial personal exposure monitoring shall be conducted. Initial exposure monitoring of the current job will consist of: breathing zone air samples that are representative of 8-hour time weighted average; 30-minute, short-term exposures of each employee; those operations to be conducted over the course of the job. Exposure monitoring will be conducted following protocols described in 29 CFR 1926.1101 Appendix B, OSHA method ID-160, or NIOSH Method 7400.

### Periodic Monitoring

Once initial exposure monitoring has been conducted to characterize employee exposure, periodic follow-up monitoring is required to validate the exposure assessment and verify the continued effectiveness of engineering and work practice controls. Table B-1 summarizes periodic follow-up monitoring requirements.

**Table B-1. Periodic Follow-up Monitoring Requirements**

JOB DESCRIPTION	EMPLOYEES AFFECTED	FREQUENCY	TERMINATION OF MONITORING
Class I & II work, without use of supplied air respirators	Representative samples for all employees in the regulated area	Daily	When statistically reliable measurements indicate exposure < PEL & excursion limit
Class I & II work, using supplied air respirators	Representative samples for all employees in the regulated area	Not Required	
Class III & IV work	Representative of all employees expected to exceed the PEL or excursion limit	Intervals sufficient to document exposure	

### Additional Monitoring

Additional personal exposure monitoring must be initiated whenever there is a change in processes, exposure control equipment, personnel, work practices or other change that may result in new or additional exposures above the PEL or excursion limit.

## **Appendix C: Competent Person Responsibilities**

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A *Competent Person* is an individual designated by the park who has the qualifications (training) and authority to ensure worker safety and health during asbestos-construction activities. All asbestos work conducted in regulated areas must be supervised by a competent person.

### Responsibilities

On worksites where employees are engaged in Class I or II asbestos work, the designated competent person shall perform or supervise the following duties, as applicable:

1. Set up the regulated area, enclosure or other containment.
2. Ensure (by on-site inspection) the integrity of the enclosure or containment.
3. Set up procedures to control entry to and exit from the enclosure and/or area.
4. Supervise all employee exposure monitoring, ensuring that all required monitoring is conducted using appropriate protocols.
5. Ensure that employees working within an enclosure or using glove bags wear required respirators and protective clothing.
6. Ensure through on-site supervision, that employees set up, use and remove engineering controls, use work practices and personal protective equipment in compliance with all requirements.
7. Ensure that employees use the hygiene facilities and observe the decontamination procedures specified.
8. Ensure through on-site inspection, that engineering controls are functioning properly and employees are using proper work practices.
9. Ensure that notification requirements are met.

### Inspections

The competent person will perform frequent and regular general safety and health inspections of job sites, materials and equipment. For Class I jobs, on-site inspections shall be made at least once during each work shift and at any time at employee request. For Class II, III and IV jobs, on-site inspections shall be made at intervals sufficient to assess whether conditions have changed, and at any reasonable time at employee request.

### Training

1. *Class I and II Asbestos Work.* For class I and II asbestos work, the competent person shall be trained in all aspects of asbestos removal and handling, including: abatement, installation, removal and handling; the contents of 29 CFR 1926.1101; the identification of asbestos; removal procedures, where appropriate; and other practices for reducing the hazard. Such training shall be obtained in a comprehensive course for supervisors that meet the criteria of EPA's Model Accredited Plan (40 CFR part 763, subpart E, Appendix C).
2. *Class III and Class IV.* For Class III and IV asbestos work, the competent person shall be trained in aspects of asbestos handling appropriate for the nature of the work, to include procedures for setting up glove bags and mini-enclosures, practices for reducing asbestos exposures, use of wet methods, the contents of this section (4.10), and the identification of asbestos. Such training shall include successful completion of a course that is consistent with EPA requirements for training of maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2), or its equivalent.

## **Appendix D: Medical Surveillance**

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Parks must provide for medical surveillance for all employees engaged in Class I, II and III work who are exposed at or above the permissible exposure limit for a combined total of 30 or more days per year. Workers that conduct only Class II or Class III operations on intact material following required exposure control practices for one hour or less, including cleanup, are not included.

In addition, medical clearance is required for those employees required to wear a negative pressure respirator (refer to Section 4.3, Respiratory Protection).

Required medical examinations must be performed by or under the supervision of a licensed physician, and are provided at no cost to the employee at a reasonable time and place.

### **Frequency**

Medical surveillance will be provided according to the following schedule:

1. Prior to assignment to an area requiring the use of a negative-pressure respirator to protect against asbestos fiber exposure.
2. When the employee is assigned to an area where exposure to asbestos may be at or above the permissible exposure limit for 30 or more days per year, or when an employee is engaged in Class I, II or III work for a combined total of 30 or more days per year, a medical examination must be given within 10 working days following the 30 day of exposure. At least annually or more frequently if determined necessary by the physician.

### **Examination Contents**

The contents of medical surveillance examinations are given in 29 CFR 1926.1101 (m)(2)(ii). In support of the examination, the park must provide the physician the following information:

1. A copy of 29 CFR 1926.1101 and its appendices D, E and I.
2. A description of the employee's duties potentially exposing them to asbestos.
3. The employee's asbestos exposure level determined through personal exposure monitoring or anticipated exposure level.

4. A description of personal protective and respiratory equipment used.
5. Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

*Physician's Written Opinion*

The physician will provide the park a written opinion containing the results of the medical examination and shall include:

1. The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an unacceptable increased risk of health impairment from exposure to asbestos.
2. Recommended limitations on the employee or on the use of personal protective equipment such as respirators.
3. A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
4. A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.

The employee's written approval may be required under the requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) for the physician to be able to release a written opinion to the park. The park shall provide a copy of the physician's written opinion to the affected employee within 30 days from its receipt.

## **4.9 LEAD EXPOSURE CONTROL**

### **Introduction**

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Lead exposure that leads to serious health effects can occur on the job, at home or at play. Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

Young and unborn children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness and brain damage. At very low levels of exposure, lead can affect a child's mental and physical growth. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties and reduced growth in young children.

Controlling exposure to lead requires the coordinated efforts of several program staffs within the park. This section is divided into two subsections based primarily on the at-risk population. Section 4X.1 focuses on worker protection requirements and is driven primarily by the Occupational Safety and Health Administration (OSHA) construction and general industry regulations. The protection of housing and building occupants and requirements for lead-based paint management are contained in Section 4X.2. This section has its basis in Environmental Protection Agency (EPA) and Department of Housing and Urban Development (HUD) regulations.

In practice, the requirements and responsibilities presented within these subsections are often intertwined and interdependent. Lead exposure control must be well coordinated between divisions in order to protect all at-risk populations.

### **National Park Service Lead Exposure Control Policy**

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A program of lead management and worker and facility occupant exposure protection will be implemented in each park where lead hazards exist.

### **Scope**

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Subsection 4X.1 applies to all circumstances where an employee or volunteer may be occupationally exposed to lead and includes all construction work (regulated under 29 CFR 1926.62) and non-construction exposures (regulated under 29 CFR 1910.1025). Section 4X.2 applies to lead-based paint hazards in all residences and public buildings owned or managed by the park. These sections are not mutually exclusive.

## References

1. 24 CFR 35, Lead-Based Paint Poisoning Prevention in Certain Residential Structures, Subparts C and D
2. 29 CFR 1910.1025. Lead Exposure in General Industry
3. 29 CFR 1926.62, Lead Exposure in Construction
4. 29 CFR 1910.1200, Hazard Communication
5. HUD. 1998. Technical Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Department of Housing and Urban Development
6. 40 CFR 745, Lead-Based Paint Activities
7. NPS-36 Government Furnished Housing Management Guideline
8. NPS 76 Housing Design and Rehabilitation Guideline.
9. NPS. 1997. Health Hazards of Asbestos, Lead and Radon Gas in National Park Service Housing, Interim Issue, July 25, 1997
10. EPA. 2001. Protect Your Family From Lead in Your Home. EPA747-K-99-001

**Caution:** In addition to the regulatory citations listed here, park management must be familiar with, and comply with, applicable regulations of state and local jurisdictions. Refer to your park and regional risk management and hazardous materials program managers for local guidance.

## Definitions

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*Abatement* means measures designed to permanently reduce or eliminate lead hazards or lead-based paint from residential or public buildings.

*Public Building* means a structure which is generally accessible to the public, including but not limited to schools, daycare centers, museums, airports, hospitals, stores, convention centers, government facilities, office buildings and any other building which is not an industrial building or residential building. Industrial buildings and warehouses are excluded.

*Competent person* means a person designated by the park who is capable of identifying existing and potential lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

*Permissible Exposure Level (PEL)* means the maximum allowable airborne exposure to which unprotected workers may be exposed to lead. The PEL for lead is 50 ug/m<sup>3</sup> as an eight-hour time-weighted average (TWA).

*Action Level* means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 ug/m<sup>3</sup>) calculated as an eight-hour TWA. Worker exposure at the action level triggers worker protection and compliance requirements, including employee training and biological (blood) monitoring.

*Lead-Based Paint Hazard* means a condition of unacceptable risk to occupants of residences and public buildings. The following are lead-based paint hazards as defined by HUD and EPA.

- Two (2) square feet of deteriorated paint on interior components such as walls, ceiling, doors.
- >10 square feet of exterior components.
- >10% deteriorated paint on interior/exterior components with small areas such as sills and trim.
- Caution: Some jurisdictions regard any deteriorated lead-based paint as a lead-based paint hazard.

*Lead-Based Paint Activities* means any construction, alteration, painting, demolition, renovation, repair or maintenance of any residential or public buildings (including preparation and cleanup) that, by using or disturbing lead-containing material or soil, may result in significant lead exposure of adults or children occupying residences or public buildings. Work meeting this definition invokes EPA and HUD occupant protection and lead-based paint activities certification regulations. However, it should be noted that all construction work that could expose workers to lead are regulated under 29 CFR 1926.62.

*Lead-Based Paint* is paint containing at least 0.5 percent or 5000 ppm lead by weight or 1.0 milligram per square centimeter (mg/cm<sup>2</sup>) of paint film surface area. Occupant protection requirements are triggered at lead concentrations at these levels or greater in paint films in housing and public buildings.

*Lead-Containing Paint* means any paint containing lead in any amount detectable by current laboratory methods (for example: OSHA method ID-121, atomic absorption spectroscopy or OSHA method ID-125G, ICP-MS). Worker protection regulations are triggered by the presence of any detectable level of lead in paint. Note that in 1978 the Consumer Product Safety Commission-banned consumer paint products containing more than 0.06% lead. Although not lead-based paint, enough lead may exist in these products to trigger OSHA worker protection and exposure assessment requirements.

## Controlling Worker Exposure to Lead

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### Program Elements

#### 1. *Lead Hazard Identification.*

- a. *Prior to Lead Construction Activities.* Determine whether lead exists in construction material or surface coatings prior to beginning any maintenance, remodeling, renovation or abatement activity where there is a possibility of disturbing lead. For compliance with OSHA worker protection requirements, sampling for lead identification must be conducted by an experienced industrial hygienist, certified lead-based paint inspector, certified lead supervisor or competent person who has received training in sample collection. Lead-based paint identification and hazard assessment in housing must be conducted by a certified lead inspector or risk assessor.
- b. *Non-Construction Activities.* Lead hazards in non-construction activities will be identified through implementation of the Park's Occupational Exposure Assessment (see section 4.1), Job Hazard Analysis (see section 3.1) and Hazard Communication (see section 4.4) programs.

#### 2. *Characterization of Worker Exposure.*

Worker exposure to lead must be characterized whenever workers might disturb lead in the course of their maintenance, remodeling, repair or abatement work or when there is a potential for exposure to lead in non-construction activities. Unprotected exposure may not exceed 50 ug/m<sup>3</sup> on an eight-hour TWA. Exposures greater than 30 ug/m<sup>3</sup> TWA will necessitate implementation of protective measures and the requirements. Specific exposure assessment monitoring requirements are found in Appendix A.

#### 3. *Written Exposure Control Plan.*

A written exposure control plan must be prepared and implemented prior to beginning any construction job or work task where exposures may reach the PEL of 50 ug/m<sup>3</sup> TWA. The written program will describe each activity and specific responsibilities and measures used to reduce exposure and achieve compliance with worker protection program elements. Appendix B provides specific requirements for written exposure control plans as well as a sample plan.

4. *Lead Safe Work Practices.*

Engineering and work practice controls, including administrative controls, must be used to reduce and maintain employee exposure to lead at or below the permissible exposure limit to the extent feasible. Lead safe work practices and prohibited activities are provided in Appendix C. Appendix F provides strategies for administrative and work practice controls for reducing lead exposure at indoor and outdoor weapons firing ranges.

5. *Respiratory Protection and Protective Clothing and Equipment.*

When engineering and administrative controls cannot adequately reduce exposure to below the PEL or when conducting target tasks (see Appendix A) without a negative exposure assessment, employees must be provided respirators and appropriate protective work clothing and equipment that prevent contamination of the employee and the employee's garments and ensure their use. Employees may choose to use a powered air-purifying respirator (PAPR) rather than a negative pressure air-purifying respirator. When respirators are required, PAPRs must be provided if requested by the employee as long as the PAPR will provide adequate protection.

6. **Provide Biological Monitoring (Blood Testing), Medical Surveillance and Medical Removal.**

- a. Biological monitoring (blood testing for blood lead level and zinc protoporphyrin must be provided to any worker whose exposure exceeds the Action Level exposure (30 mg/m<sup>3</sup>).
- b. Initial medical surveillance (physician's examination) will be made available to any worker who may be exposed above the action level for 30 days or more in a 12-month period.
- c. Workers with blood lead levels greater than 50 ug/dl must be removed from lead-hazardous work. During this period, employment and compensation will be protected.

7. *Lead Hazard Communication, Employee Information, Training and Certification.*

- a. Inform employees of the location of lead-based paint hazards and communicate the hazards of lead exposure to building occupants prior to remodeling and renovation activities involving the disturbance of lead.

- b. All maintenance workers required to perform maintenance, remodeling or renovation which might result in the disturbance of lead at a level greater than the Action Level must receive training in lead exposure hazards, compliance requirements and lead-safe work practices.
- c. All workers conducting lead-based paint abatement or involved in large construction or renovation projects in housing or public buildings will receive lead worker training and certification according to state regulations of the state in which the work is being conducted if a state program exists, or EPA regulations if there is not state certification program. All supervisors of such projects will receive training and certification as lead work supervisors.
- d. Risk assessments in residences and public buildings will only be performed by individuals trained and certified as a lead risk assessor according to the regulations of the state in which the work is being conducted (if a state program exists) or EPA regulations (if there is not a state certification program).
- e. Lead paint inspections of residences and public buildings must be performed by individuals trained and certified as lead inspectors according to the regulations of the state in which the work is being conducted (if a state program exists) or EPA regulations (if there is no state certification program).
- f. Abatement projects in residences and public buildings must be designed by a certified lead supervisor or certified lead planner/project designer.
- g. Contractors will be informed of all known or presumed lead-based paint and lead hazards prior to beginning work on park-owned or managed facilities or structures.
- h. All employees potentially exposed to lead during non-construction activities must receive training in accordance with 29 CFR 1910.1025 and the park's hazard communication program.

#### 8. *Waste Disposal.*

Lead-containing debris or construction wastes may require special handling and disposal as hazardous waste. Generally, debris containing lead residue must be sampled and tested using the Toxicity Characteristic Leaching Procedure (TCLP) to characterize its waste status. Debris passing the test may be considered construction debris, while debris that fails the test must be disposed of as hazardous waste. Caution: some states require the use of different testing procedures necessitating a different interpretation. Refer to your hazardous waste program manager for guidance on requirements of your local jurisdiction.

## 9. *Record-Keeping.*

Parks must maintain the following records related to lead activities:

- a. Exposure Assessment – all monitoring and data used in conducting an assessment (i.e., dates, number, duration, tasks, location and results of sampling procedures) must be maintained for at least 30 years.
- b. Objective Data for Monitoring Exemptions – information demonstrating that a particular product, material, procedure, operation or activity cannot release lead dust or fumes at or above the Action Level must be maintained for at least 30 years. Objective data can be obtained from industry-wide studies or exposure assessments.
- c. Medical Surveillance – physician's written opinion, results of biological monitoring and any other records prescribed by 29 CFR 1926.62 (n) must be maintained for the duration of employment plus 30 years.
- d. Medical Removal – all information pertaining to removal of an employee from a current exposure to lead must be maintained for the duration of employment. This information must include the date of each occasion the employee was removed as well as the corresponding date the employee returned, the cause of removal and statements explaining how the removal was handled.
- e. Training records and lead-based paint certifications must be maintained for the duration of employment plus one year.
- f. All records must be made available upon request to the affected employees, former employees and their designated representatives.

## **Lead-Based Paint Risk Management in Housing, Public Buildings and Other Structures**

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### *Program Elements*

#### 1. *Use of Lead-Based Paint.*

Paint containing greater than 600 ppm lead must not be used on park buildings or recreational equipment and structures such as playground equipment and picnic tables. Lead-based paints must not be used on industrial equipment and structures when a suitable substitute is available.

## 2. *Lead Hazard Identification.*

Parks must determine the existence of lead hazards and evaluate the risk of exposure to building occupants by identifying pre-1960 and pre-1978 housing. Information on housing construction dates may be readily obtained from the DOI Quarters Program Manager (housing database). There is a greater probability that pre-1978 housing will contain lead-based paint. That probability becomes even greater for pre-1960 housing. Paint or surface coatings on or in residential dwellings constructed after 1978 may be presumed to be free of lead-based paint. Because the Consumer Product Safety Commission (CPSC) ban on lead in paint did not extend to commercially used industrial products, lead-based paint may be found in buildings other than residences and structures, such as tanks, bridges and towers built after 1978.

## 3. *Disclosure of Lead Hazards.*

Parks must inform occupants of all pre-1978 housing owned or managed by the park of the risks of lead exposure in the dwelling prior to occupancy. Disclosure must include the location of lead-based paint known or presumed to exist in the dwelling, a statement that pre-1978 buildings may contain lead-based paint hazards, and a copy of the lead hazard information pamphlet "Protect Your Family from Lead in Your Home."

## 4. *Exposure Risk Evaluation*

- a. Parks will conduct lead exposure risk assessments in all child-occupied housing and childcare facilities constructed before 1978 according to the requirements of HUD Guidelines, Chapter 5, Risk Assessment. Blood lead testing will be provided for children (age 6 and below) and pregnant females occupying NPS-owned or managed housing when a risk assessment shows the existence of lead risks as defined in HUD guidelines or applicable state or local childhood lead poisoning prevention regulations. If a child's blood lead level is elevated (10 ug/dl – a level associated with adverse effects in children according to Centers for Disease Control and Prevention (CDC)), an investigation will be conducted using the protocol in HUD Guidelines, Chapter 16, Investigation and Treatment of Dwellings Housing Children with Elevated Blood Lead Levels. State childhood lead poisoning reporting and follow-up requirements must be followed.
- b. Prior to remodeling and renovation of pre-1978 housing, when the cost of such work will be greater than \$5,000 annually, a risk assessment must be conducted in accordance with 40 CFR 745.227(d) (See detailed protocol in HUD Guidelines, Chapter 5).
- c. Lead-based paint risk assessments and inspections in residences must be conducted only by state or EPA-certified lead risk assessors and inspectors.

## 5. *Lead-Based Paint Hazard Control.*

Conduct control measures to correct lead-based paint hazards in residences and public buildings whenever they are identified or prior to disposal of housing. Controls include the following: stabilizing deteriorated paint, making all horizontal surfaces smooth and cleanable, correcting friction and impact surfaces, and covering bare soil. Controls are completed when clearance is achieved in accordance with 24 CFR 35.1340.

## 6. *Protecting Building Occupants During Lead Activities.*

- a. Occupants of housing must be notified prior to conducting maintenance, remodeling, renovation, abatement, or lead hazard reduction when the cost of such work will be greater than \$5,000 annually and must be provided a copy of the lead hazard information pamphlet "Protect Your Family from Lead in Your Home."
- b. Occupants of housing and public buildings must be protected from exposure to lead during maintenance, remodeling, renovation or abatement activities following specific worksite preparation measures (see Appendix C).
- c. Clearance. Residences and public buildings in which maintenance, remodeling, renovation or abatement activities have taken place will be cleared for resumed occupancy as prescribed in Appendix C, Table 4, Clearance Requirements. Clearance of lead-based paint activities in residences and child play areas will be performed by a Certified Lead Risk Assessor, Certified Lead-Based Paint Inspector or Certified Lead-Based Paint Monitor (Certifications in accordance with 40 CFR 745). Clearance in public buildings and for work conducted on other facilities and structures may be performed by an experienced industrial hygienist, Certified Lead Supervisor or an appropriately trained competent person.

## 7. *Real Property Disposal.*

Prior to disposal of residential property constructed prior to 1978, a lead-based paint risk assessment and a lead-based paint inspection must be performed following protocols presented in HUD Guidelines, Chapter 5, Risk Assessment and Chapter 7, Lead-Based Paint Inspection.

All lead-based paint hazards identified in housing constructed before 1960 must be abated prior to disposal of the property. After completion of abatement activities, clearance inspection and environmental sampling must be achieved according to the requirements of 40 CFR 745.227. Prior to disposal of residential property constructed after 1959 but before 1978, the results of risk assessment and building inspection must be made available to prospective purchasers of the property.

#### 8. *Considerations for Historic Structures.*

Historic structures used as residences or dwellings, which may be classified as public buildings, must be maintained free of lead-based paint hazards (refer to definition of lead-based paint hazards in this section). Occupants of residences and public buildings will be protected from lead-based paint hazards and from lead exposure during maintenance, preservation, abatement or other construction activities according to the requirements of this section. This work must be conducted in compliance with the worker protection requirements of this section and 29 CFR 1926.62

Maintenance and renovation of historic buildings may be restricted by pertinent federal, state and local historic preservation regulations. However, occupant and worker protection requirements may not be waived, thus limiting the use of such structures.

## Appendix A: Worker Exposure Assessment

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### Initial Exposure Assessment

Worker exposure to lead must be assessed and characterized whenever workers might disturb lead during the course of maintenance, remodeling, repair or abatement work. Unprotected exposure may not exceed 50 ug/m<sup>3</sup> as an 8-hour time-weighted average (TWA). Exposures greater than 30 ug/m<sup>3</sup> TWA – the action level that prompts protective measures and requires the implementation of biological monitoring, employee training and periodic exposure monitoring. Exposure characterization may be accomplished by one of three methods – personal exposure monitoring, objective and historical data, and trigger tasks.

1. *Personal Exposure Monitoring* is the primary method of exposure assessment and provides the most accurate measure of exposure. Sampling and analysis is conducted following National Institute of Occupational Safety and Health (NIOSH) Methods and consist of full-shift samples (at least seven hours). Other methods may be used under the direction of a professional industrial hygienist.
2. *Objective and Historical Data*
  - a. *Historical data.* The park may rely on previous lead exposure monitoring results if they were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices and environmental conditions.
  - b. *Objective Data.* The park may rely on objective data instead of implementing initial exposure monitoring. Objective data must demonstrate that a particular product or material containing lead or a specific process, operation or activity involving lead cannot result in employee exposure to lead at or above the Action Level during processing, use or handling. A determination of the nature and relevancy of objective data should be made by a professional industrial hygienist.
3. *Trigger Tasks.* When conducting any of the tasks listed in Table A-1, exposures must be assumed, as indicated, in the absence of personal exposure monitoring or objective data.

**Table A-1 Trigger Tasks**

When these activities are conducted:	Assume that the worker's exposure level is:	And require respirators that provide at least this assigned protection factor:
<ul style="list-style-type: none"> <li>• Manual demolition, scraping and sanding</li> <li>• Heat gun use</li> <li>• Use of HEPA filtered local exhaust-equipped tools</li> </ul>	50-500 ug/m <sup>3</sup> (up to 10 times PEL)	APF ≥10 (tight-fitting half-face APR with HEPA or N100 filters, or PAPR with loose fitting hood and HEPA or N100 filters operating in continuous flow mode.)
<ul style="list-style-type: none"> <li>• Rivet busting</li> <li>• Use of non-HEPA equipment •</li> <li>Clean-up of dry abrasive blast residue</li> </ul>	500-2500 ug/m <sup>3</sup> (up to 50 times PEL)	APF ≥50 (tight-fitting full-face piece APR or PAPR)
<ul style="list-style-type: none"> <li>• Abrasive blasting</li> <li>• Welding or torch cutting, in way of lead</li> </ul>	>2500 ug/m <sup>3</sup> (greater than 50 times PEL)	APF >50 (any air-supplied respirator with tight-fitting face piece operating in the pressure demand mode.)

APF = Assigned protection factor

APR = Air purifying respirator

PAPR = Powered air purifying respirator

### Follow-Up Worker Exposure Assessment

Periodic follow-up personal air sampling must be conducted according to the following schedule:

When:	Then:
Initial monitoring, historic or objective data shows that exposure is less than the Action Level (<30ug/m <sup>3</sup> )	No additional sampling is required unless changes in work activity occur.
Initial monitoring shows that exposure is equal to or greater than the action level, but below the PEL (30-50 ug/m <sup>3</sup> )	Monitor at least every six months until two consecutive samples taken at least seven days apart are below the action level.
Initial monitoring shows that exposure is greater than the PEL (≥ 50 ug/m <sup>3</sup> )	Monitor at least quarterly until two consecutive samples at least seven days apart are less than the action level
Historical monitoring data is greater than 12 months old	Conduct initial exposure monitoring and prescribed follow-up.

## **Appendix B: Written Exposure Control Plan**

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Prior to beginning tasks where employees may be exposed to lead above the PEL, the park must establish and implement a written exposure control plan to achieve compliance with 29 CFR 1910.1025 and 29 CFR 1926.62.

Written plans must include at least the following:

- A description of each activity in which lead is emitted (e.g., equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices).
- A description of the specific means that will be employed to achieve compliance, and where engineering controls are required, engineering plans and studies used to determine methods selected for controlling exposure to lead.
- A report of the technology considered in meeting the PEL.
- Air monitoring data which documents the source of lead emissions.
- A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.
- An administrative control schedule required by paragraph (e)(4) of this section, if applicable.
- A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure to lead and with respect to responsibility for compliance with this section as set-forth in 29 CFR 1926.16.
- Other relevant information.

The compliance program must provide for frequent and regular inspections of job sites, materials and equipment to be made by a competent person.

Written programs must be submitted upon request to any affected employee or authorized employee representatives and must be available at the worksite for examination by OSHA representatives.

Written programs must be revised and updated at least every six months to reflect the current status of the program.

## Sample Lead Exposure Control Plan

### Your National Park

#### 1. *Scope.*

This program defines the requirements and procedures for achieving compliance with the permissible exposure limit (PEL) for lead (50 ug/m<sup>3</sup> as an 8 hour TWA) in accordance with 29 CFR 1926.62

#### 2. *Activities.*

- a. *a. Removal of thermoplastic traffic striping from pavement.* This will be accomplished using a model 873 Bobcat with a Universal Planer AP 450 II planer attachment, and secondarily with a small mobile walk-behind planer resembling a lawn mower. This equipment will be used to physically breakup the thermoplastic traffic striping and deposit it behind the machine in a windrow of dry debris. This activity will require one operator.
- b. *Debris collection.* A vacuum pavement sweeper will be used to collect dry striping debris. Periodically the debris must be removed from the sweeper's discharge hopper and loaded into disposal drums. Filters will not be shaken during unloading. Dry brushing will be kept to a minimum. Compressed air will not be used to clean hopper. Shoveled debris will be placed, not thrown, into drums. Unloading will not be conducted in the vicinity or upwind of designated eating or hygiene areas, or where other workers or bystanders may be exposed to drifting dust. Debris will be misted with amended water to reduce airborne dust generation during shoveling and brushing when it will not hinder equipment operation and maintenance. Debris will be misted as it is loaded into drums. Drums will be closed when not being filled. All hazardous material resulting from this contract will be disposed of at the previously approved Class 1 disposal facility at Sweethome, SD, under the Your Park's EPA ID Number ABC1234567. This activity will require one operator.
- c. *Traffic control.* Traffic will be controlled using two flaggers and one pilot car and driver.
- d. *Tab application.* Temporary marker tabs will be applied to the pavement after striping debris is removed. Two laborers will be required for this activity.
- e. *Duration.* This compliance plan will be in effect for the duration of the job which is anticipated to be three days.

### 3. *Methods of Compliance.*

The traffic striping activity is a mobile operation conducted under variable field conditions.

- a. *Equipment.* Equipment used for this activity is standard for the industry. HEPA-filtered local exhaust system technology is not available for this application. Equipment will be maintained according to the manufacturer's recommendations to ensure most effective operation.
- b. *Operating Procedures and Personal Protection.* Control of exposures will be accomplished primarily through the use of personal protective clothing and equipment and strict implementation of hygienic work practices.

### 4. *Exposure assessment.*

- a. Air monitoring data that documents the level of lead emissions resulting from these activities is not available. Personal exposure monitoring representative of workers with greatest potential exposure will be conducted during the activity according to the following schedule.
  - 1) Bobcat – planer operator. Full-shift breathing zone.
  - 2) Pavement sweeper operator. Full-shift breathing zone.
  - 3) Hopper clean-out. Full-shift breathing zone.
  - 4) Flaggers. No monitoring.
  - 5) Pilot car driver. No monitoring.
  - 6) Tab applicators. No monitoring.
- b. Air monitoring will occur on the first day of the activity and will be conducted by an independently contracted Industrial Hygienist [AirServ Environmental, 34 Howard St, Minneapolis, MN, (234) 456-6789].
- c. Sampling may be conducted of thermoplastic striping material to determine its lead content. At least three samples of each material type to be removed will be collected and analyzed for lead content by a NVLAP certified laboratory. Bulk samples will consist of all layers of material to be removed. If analysis determines that lead is not detectable, a negative exposure potential will be assumed and air monitoring will not be conducted.
- d. Until air monitoring results are available or a negative exposure potential can be assumed based on lead content of the material to be removed, exposures in excess of 500 ug/m<sup>3</sup>, but less than 2500 ug/m<sup>3</sup> will be assumed. (Guidance provided in 29 CFR1926.62 – reference power tool cleaning without dust collection systems and cleanup activities where dry expendable abrasives are used.)

5. Exposure control. Until bulk sampling or air monitoring results demonstrate a negative exposure, the following equipment will be provided and used.
  - a. *Respiratory protection and personal protective equipment.* The following equipment will be worn by the Bobcat-planner operator, pavement sweeper operator and sweeper hopper cleaner during removal, sweeping and hopper cleaning operations.
    - 1) Full-face air purifying or powered-air purifying respirators equipped with N-100 filters. Use of respirators will be in accordance with Your Park's written respiratory protection program and meet the requirements of 29 CFR 1910.134.
    - 2) Reusable cotton or disposable coveralls.
    - 3) Coveralls will not be worn off the work site. Street clothes will be protected from contamination. A clean changing site will be designated. If reusable, they will be laundered and provided clean each week. Laundry facilities will be notified that clothing is contaminated with lead dust in accordance with 29 CFR 1926.62.
    - 4) Additional personal protective equipment such as safety shoes, eye protection, reflective vests, hard hats and other, may be required, but are not presented in this lead-compliance program.
  - b. *Housekeeping.* Heavy accumulation of dust on clothing and equipment will be removed by HEPA-filtered vacuums or by wet wiping. Dry sweeping, dry brushing and compressed air will not be used to clean equipment. Every effort will be made to minimize accumulations of dust on equipment and to prevent dust from becoming airborne.
  - c. *Hygiene facilities and practices.*
    - 1) Food and beverages will not be consumed in the work area. Tobacco products will not be used in the work area. Cosmetics will not be applied in the work area.
    - 2) An eating area will be designated outside of the work area. Workers will remove surface dust from protective clothing prior to entering the eating area.
    - 3) Hand-washing facilities will be provided. Workers will wash their hands and face prior to eating, drinking, smoking or applying cosmetics, and at the end of the work shift.

- d. Signs. Signs that read “Warning, Lead Work Area, Poison, No Smoking or Eating,” in a language understood by all workers, will be posted on the Bobcat-planer and pavement sweeper.
  - e. Biological monitoring. Blood sampling and analysis will be conducted for lead and zinc protoporphyrin levels for the Bobcat-planer operator, pavement sweeper operator and sweeper hopper cleaner prior to beginning striping removal activities. This blood sampling and analysis will be conducted by Your Park’s medical services provider, Federal Occupational Health, (555) 810-1214.
6. *Training.* All employees covered by this compliance program will receive training that communicates the hazards of lead exposure and work practices and requirements for the minimization of exposure. Training will review the contents and requirements of this compliance program and Appendix A, 29 CFR 1926.62, Substance Data Sheet for Occupational Exposure to Lead. Training will be conducted prior to initiation of work and in a language understood by all workers.
7. *Competent Person.* Your Park has designated \_\_\_\_\_ as the competent person with responsibility for implementing the provisions of this program in the field.
8. *Implementation Schedule.* Implementation schedule is provided as an attachment to this plan. The schedule provides documentation of the implementation of this compliance program. Documentation will include copies of training records, purchase orders and service contracts.

<sup>1</sup>Note: Competent Persons are required by 29 CFR 1926 for construction operations. The competent person must possess the training to recognize workplace hazards including lead related hazards and the authority to make corrections to situations posing unacceptable risk to workers. For lead-based paint activities, this role may be served by a certified lead-based paint supervisor adequately training in construction safety topics pertinent to the work at hand.

## **Appendix C: Safe Practices for Worker and Occupant Protection**

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### Summary of lead worker compliance requirements

Action required at the Action Level of 30 ug/m<sup>3</sup> of air:

1. Periodic air sampling
2. Biological monitoring
3. Training

Additional action required at the PEL:

4. Written compliance program
5. Provide respiratory protection (including a respiratory protection program)
6. Provide protective clothing including coveralls, gloves, hats, shoes, face shields, etc.
7. Provide hygiene facilities including change areas, at least hand-washing facilities and showers where feasible, eating facilities, enforce mandatory hand-washing practices if showers are not feasible, etc.
8. Utilize work practices including engineering controls that are addressed in the compliance program
9. Provide warning signs.

### Prohibited practices

The following practices are prohibited:

- Open-flame burning or torching
- Abrasive blasting without HEPA vacuum local exhaust
- Machine sanding or grinding without HEPA vacuum local exhaust
- Heat guns at temperatures over 1100°F
- Dry scraping (exception around electricity or for very small areas such as nail holes)

- Methylene chloride-based strippers
- Paint stripping in a poorly ventilated space using a volatile stripper that is a hazardous substance.

### Respiratory Protection

Respirators must be used when an employee's exposure to lead exceeds the PEL. A respirator will be provided to employees requesting a respirator when exposure is less than the PEL following guidance for the voluntary use of respirators in Section 4.X Respiratory Protection. Employees must be provided a powered air-purifying respirator when respirators are required and they choose to use such a respirator and as long as it will provide adequate protection. Filtering face pieces will not be used for lead work.

### Personal Protective Equipment

When employees are exposed to lead above the PEL they must be provided and be required to use the following personal protective equipment:

- Coveralls or similar full-body work clothing.
- Gloves, hats and shoes or disposable shoe coverlets.
- Face shields, vented goggles.

Protective clothing must be cleaned at least weekly, or daily when employees are exposed to lead at levels over 200 ug/m<sup>3</sup> (TWA). Protective clothing must be removed at the completion of a work shift. Designated change areas must be provided whenever personal protective equipment is required. Clean areas will have separate storage facilities for protective work clothing and equipment and for street clothes so that cross-contamination is prevented. Employees will not leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift.

Seal lead contaminated clothing or equipment in plastic bags to prevent release of lead and inadvertent exposure. Inform, in writing, any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead. Bags must be labeled with the following warning:

Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state or federal regulations.

Do not remove lead dust from protective clothing or equipment by blowing, shaking or any other means that disperses lead into the air.

### Housekeeping

Surfaces will be kept as clean and free of dust and debris as possible. Floors and other surfaces where lead accumulates will be cleaned using a HEPA-equipped vacuum cleaner or wet cleaning methods that minimize the likelihood of lead becoming airborne. Do not dispose of waste water in residential sinks, bathtubs or yards.

Compressed air must not be used without an effective local exhaust ventilation system designed to contain the airborne dust created by the compressed air. Shoveling, dry or wet sweeping, and brushing should not be used. Do not dispose of waste in residential trash.

### Hygiene Facilities and Practices

Do not consume food or beverages, use tobacco products, or apply cosmetics in work areas.

Shower facilities must be provided, where feasible, for use by employees whose airborne exposure to lead is above the PEL.

Hand washing facilities must be available and used by employees to wash their hands and face prior to eating, drinking, smoking or applying cosmetics.

Lunchroom facilities or eating areas must be as free as practicable from lead contamination and must be available for employees whose airborne exposure to lead is above the PEL. Employees will not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, downdraft booth or other cleaning methods that limit dispersion of lead dust.

## Worksite Preparation and Occupant Protection

**Table C-1. Interior Worksite Preparation Levels (not including windows)**

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
<b>Typical Applications</b>	Dust removal and any abatement or interim control method disturbing no more than 2 ft2 of painted surface per room.	Any interim control or abatement method disturbing between 2 and 10 ft2 of painted surface per room	Same and level 2	Any interim control or abatement method disturbing more than 10 ft2 per room
<b>Time limit per dwelling or public building space</b>	One work day	One work day	Five work days	None
<b>Occupant location</b>	Inside dwelling, but outside work area. Occupant must have lead-safe passage to bathroom, at least one living area, and entry/egress pathways. Alternately, occupant can leave the dwelling during the work day.	Same as level 1	Outside the dwelling, but can return in the evening after day's work and cleanup are completed. Occupant must have safe passage to bathroom, at least one living area and entry/egress pathways upon return. Alternately, Occupant can leave until all work is completed.	Outside the dwelling for duration of project, but cannot return until clearance has been achieved.
<b>Containment and Barrier System</b>	Single layer of plastic sheeting on floor extending 5 feet beyond the perimeter of the treated area in all directions. No plastic sheeting on doorways is required, but a low physical barrier such as furniture, wood planking to prevent inadvertent access by occupant is recommended. Children should not have access to plastic sheeting (suffocation hazard.)	Two layers of plastic on entire floor. Plastic sheet with primitive airlock flap on all doorways. Doors secured from inside the work area need not be sealed. Children should not have access to plastic sheeting (suffocation hazard.)	Two layers of plastic sheet with primitive airlock flap on all doorways to work areas. Doors secured from inside the work area need not be sealed. Overnight barrier should be locked or firmly secured. Children should not have access to plastic sheeting (suffocation hazard.)	Two layers of plastic on entire floor. If entire unit is being treated, cleaned and cleared, individual room doorways need not be sealed. If only a few rooms are being treated, seal all doorways with primitive air-lock flap to avoid cleaning entire dwelling. Doors secured from inside the work area need not be sealed.

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
<b>Warning Signs</b>	Required at entry to room but not on building (unless exterior work is also underway).	Same as Level 1	Posted at main and secondary entryways, since resident will not be present to answer the door.	Posted at building exterior near main and secondary entryways.
<b>Ventilation System</b>	Dwelling ventilation system turned off, but vents need not be sealed with plastic if they are more than 5 feet away from the surface being treated. Negative pressure zones are not required, unless large supplies of fresh air must be admitted into the work area to control exposure to other hazardous substances such and solvent vapors.	Turned off and all vents in room sealed with plastic. Negative pressure zones are not required, unless large supplies of fresh air must be admitted into the work area to control exposure to other hazardous substances such as solvent vapors.	Same as level 2	Same as level 2
<b>Furniture</b>	Left in place uncovered if furniture is more than 5 feet from working surface. If within 5 feet, furniture should be sealed with a single layer of plastic or moved for the paint treatment. No covering is required for dust removal.	Removed from work area. Large items that cannot be moved can be sealed with a single layer of plastic sheeting and left in work area.	Same as level 2	Same as level 2

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
<b>Cleanup</b>	HEPA vacuum, wet wash and HEPA vacuum all surfaces and floors extending 5 feet in all directions from the treated surface. For dust removal work alone, a HEPA vacuum and wet wash cycle is adequate. Also wet wash and HEPA vacuum floor in adjacent areas used as pathway to work area. Do not store debris inside the building overnight; transfer to a locked secure area at the end of each day.	HEPA vacuum, wet wash and HEPA vacuum all surfaces in the room. Also wet wash and HEPA vacuum floor in adjacent areas used as pathway to work area. Do not store debris inside dwelling overnight; use a secure locked area.	Remove top layer of plastic from floor and discard. Keep bottom layer of plastic on floor for use on the next day. HEPA vacuum, wet wash and HEPA vacuum all surfaces in room. Also wet wash and HEPA vacuum floor in adjacent areas used as pathway to work area. Do not store debris inside dwelling overnight; use a secure locked area.	Full HEPA vacuum, wet wash and HEPA vacuum cycle, as detailed in chapter 14.

**Table C-2. Exterior Worksite Preparation Levels (Not including windows)**

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3
<b>Application</b>	Any interim control or abatement method disturbing less than 10 ft <sup>2</sup> of exterior painted surface per dwelling. Also includes soil control work.	Any interim control or abatement method disturbing 10 to 50 ft <sup>2</sup> of exterior painted surface per dwelling. Also includes soil control work.	Any interim control or abatement method disturbing more than 50 ft <sup>2</sup> of exterior painted surface per dwelling. Also includes soil control work.
<b>Time limit per dwelling or public building space</b>	One day	None	None
<b>Occupant location</b>	Inside dwelling but outside work area for duration of project until cleanup has been completed. Alternatively, occupant can leave until all work has been completed. Occupant must have lead-safe access to entry/egress pathways.	Relocated from dwelling during work-day, but may return after daily cleanup has been completed.	Relocated from dwelling for duration of project until final clearance is achieved.

DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3
<b>Containment and Barrier system</b>	One layer of plastic on ground extending 10 ft beyond the perimeter of working surfaces. Do not anchor ladder feet on top of plastic (puncture the plastic to anchor ladders securely to ground). For all other exterior plastic surfaces, protect plastic with boards to prevent puncture from falling debris, nails, etc, if necessary. Raise edges of plastic to create a basin to prevent contaminated runoff in the event of unexpected precipitation. Secure plastic to side of building with tape or other anchoring system (no gaps between plastic and building). Weight all plastic sheets down with two-by-fours or similar objects. Keep all windows within 20 ft of working surfaces closed, including windows of adjacent structures.	Same as level 1	Same as level 1
<b>Playground Equipment, Toys, Sandbox</b>	Remove all movable items to a 20 ft distance from working surfaces. Items that cannot be readily moved to a 20 ft distance can be sealed with taped plastic sheeting.	Same as level 1	Same as level 1
<b>Security</b>	Erect temporary fencing or barrier tape at a 20 ft perimeter around working surfaces (or less if distance to next building or sidewalk is less than 20 ft). If an entryway is within 10 ft of working surfaces, require use of alternative entryway. If practical, install vertical containment to prevent exposure. Use a locked dumpster, covered truck or locked room to store debris before disposal.	Same as Level 1	Same as level 1
<b>Signs</b>	Post warning signs on the building and at a 20ft perimeter around building (or less if distance to next building or sidewalk is less than 20 ft).	Same as level 1	Same as level 1
<b>Weather</b>	Do not conduct work if wind speeds are greater than 20 miles per hour. Work must stop and cleanup must occur before rain begins.	Same as Level 1	Same as Level 1
<b>Clean up</b>	Do not leave debris or plastic out overnight if work is not completed. Keep all debris in secured area until final disposal.	Same as level 1	Same as level 1
<b>Porches</b>	One lead-safe entryway must be made available to occupants at all times. Do not treat front and rear porches at the same time if there is not a third doorway.	Front and rear porches can be treated at the same time, unless unprotected worker must use the entryway.	Same as level 2

**Table C-3. Window Treatment of Replacement Worksite Preparation**

<b>Appropriate Applications</b>	Any window treatment or replacement.
<b>Occupant Location</b>	Remain inside dwelling but outside work area until project has been completed. Alternatively, leave until all work has been completed. Occupants must have access to lead-safe entry/egress pathway.
<b>Time Limit Per Dwelling or Public Building Space</b>	None
<b>Containment and Barrier System</b>	One layer of plastic sheeting on ground or floor extending 5 feet beyond perimeter of window being treated/replaces. Two layers of plastic taped to interior wall if working on window from outside. If working from the inside, tape two layers of plastic to exterior wall. If working from inside, implement a minimum Interior Worksite Preparation Level 2. Children cannot be present in an interior room where plastic sheeting is located due to suffocation hazard. Do not anchor ladder feet on top of plastic (puncture the plastic to anchor ladders securely to ground). For all other exterior plastic surfaces, protect plastic with boards to prevent puncture from falling debris, nails, etc. is necessary. Secure plastic to side of building with tape or other anchoring system (no gaps between plastic and building). Weigh all plastic sheets down with two-by-fours or similar objects. All windows in dwelling should be kept closed. All windows in adjacent dwellings that are closer than 20 ft to the work area should be kept closed.
<b>Signs</b>	Post warning signs on the building and at a 20-ft perimeter around building (or less if distance to next building or sidewalk is less than 20 feet). If window is to be removed from inside, no exterior sign is necessary.
<b>Security</b>	Erect warning signs on the building and at a 20-ft perimeter around building (or less if distance to next building or sidewalk is less than 20 feet). Use a locked dumpster, covered truck or locked room to store debris before disposal.
<b>Weather</b>	Do not conduct work if wind speeds are greater than 20 miles per hour. Work must stop and cleanup must occur before rain begins, or work should proceed from the inside only.
<b>Playground Equipment, Toys, Sandbox</b>	Removed from work area and adjacent areas. Remove all items to a 20 ft distance from dwelling. Large, unmovable items can be sealed with taped plastic sheeting.
<b>Cleaning</b>	If working from inside, HEPA vacuum, wet wash and HEPA vacuum all interior surfaces within 10 ft of work area in all directions. If working from the exterior, no cleaning of the interior is needed, unless the containment is breached. Similarly, no cleaning is needed on the exterior if all work is done on the interior and the containment is not breached. If containment is breached, then cleaning on both sides of the window should be performed. No debris or plastic should be left out overnight if work is not completed. All debris must be kept in a secure area until final disposal.

**Table 4. Minimum Clearance Requirements<sup>1</sup>**

SCOPE OF WORK	TYPE OF FACILITY	CLEARANCE REQUIREMENT
Maintenance, renovation, lead hazard reduction or abatement at greater than de minimis levels <sup>2</sup>	Residences and child play areas	Visual inspection, dust sampling, reporting in accordance with 24 CFR 35.1340 and 40 CFR 745.227
Maintenance, renovation, lead hazard reduction or abatement at or less than de minimis levels	Residences and child play areas	Visual inspection, dust sampling, reporting in accordance with 24 CFR 35.1340 and 40 CFR 745.227
Maintenance, renovation, lead hazard reduction or abatement at greater than de minimis levels	Public Buildings	Visual inspection required, dust sampling recommended
Maintenance, renovation, lead hazard reduction or abatement at greater than de minimis levels	Public Buildings	Visual inspection
Maintenance, renovation, lead hazard reduction or abatement	All other facilities and structures	Visual inspection

<sup>1</sup>Parks must comply with clearance requirements of states and local jurisdictions when they are more stringent than federal requirements.  
<sup>2</sup>De minimis levels. Safe work practices are not required when maintenance or hazard reduction activities do not disturb painted surfaces that total more than:

- (1) 20 square feet (2 square meters) on exterior surfaces;
- (2) 2 square feet (0.2 square meters) in any one interior room or space; or
- (3) 10 percent of the total surface area on an interior or exterior type of component with a small surface area. Examples include window sills, baseboards and trim.

## Appendix D: Biological Monitoring, Medical Surveillance & Medical Removal

### Biological Monitoring

Biological monitoring, which consists of blood lead level and blood zinc protoporphyrin sampling and analysis, must be provided at no cost to employees engaged in construction work when they are exposed at any time above the action level and to employees engaged in non-construction work when exposed above the Action Level for 30 days or more in any 12-month period. The frequency of monitoring is as follows:

WHEN EMPLOYEE EXPOSURE IS:	CONDUCT BIOLOGICAL MONITORING:	
greater than the action level for less than 30 days/year as the result of construction activities	once – initial testing only – unless result > 40 ug/dl	
greater than the action level more than 30 days/year as a result of construction activities	every 2 months for 6 months and then every 6 months unless > 40 ug/dl	
greater than the action level more than 30 days/year as a result of non-construction activities	Every 6 months unless >40 ug/dl	
WHEN:	CONDUCT BIOLOGICAL MONITORING:	
blood test results are greater than 40 ug/dl	every 2 months until 2 consecutive test results are < 40 ug/dl	
employee is on medical removal	monthly during removal period	
any blood lead test results are greater than 50 ug/dl.	within 2 weeks	

Employees must be notified of test results by the park in writing within five working days of the park receiving biological monitoring results.

### Medical Surveillance

The Park must make a medical surveillance program conducted under the supervision of a licensed physician available to any worker exposed to lead above the action level for 30 days or more per year. Medical surveillance must be available at no cost to employees. An initial medical surveillance (exam) must be made available to any worker who may be exposed to lead above the Action Level for 30 days or more per 12-month period. Follow-up medical exams will be made available when the following occur:

- When blood test results are >40 ug/dl at any time during the past 12 months.
- When an illness is discovered that might get worse if the worker is exposed to lead. Exams must be provided as soon as possible if the employee displays symptoms of lead intoxication or if the employee demonstrates difficulty breathing while using a respirator.

- When the employee is pregnant.
- When an employee desires medical advice on the effects of current or past lead exposure on fertility and pregnancy.
- As medically appropriate for each employee either removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited pursuant to a final medical determination.

#### Procedures for Medical Examinations

1. Parks will provide the examining physician with:
  - a. A copy of 29 CFR 1926.62 and all of its appendices.
  - b. A description of the affected employee's duties as they relate to the employee's exposure.
  - c. The employee's exposure level or anticipated exposure level to lead and to any other toxic substances.
  - d. A description of any personal protective equipment used or to be used.
  - e. Prior blood lead determinations.
  - f. All prior written medical opinions concerning the employee in the employer's possession or control.
2. Medical Surveillance Exams will be conducted consistent with the requirements of 29 CFR 1926.62 (j), Medical Surveillance. This section of the CFR describes specific requirements for required examinations that are to be followed.
3. The park will provide for the review and examination requirements of a second physician's opinion if the employee advises the park of his or her intention to seek a second opinion, and takes steps to make an appointment with a physician within 15 days of notification of the initial physician's determination or notification of the right to a second opinion. Employees will be advised of their right for a second physician opinion whenever a medical surveillance exam is required to review any findings, determinations or recommendations of the initial physician and conduct any examinations, tests or consultation necessary to facilitate the review. If differences in the findings, determinations or recommendations of the second physician differ from those of the initial physician, then the park and the employee must assure that efforts are made for the two physicians to resolve any disagreement

in accordance with the requirements of 29 CFR 1910(j). The park must provide the foregoing information to a second or third physician conducting a medical examination or consultation upon request either by the second or third physician, or by the employee.

*Written medical opinions*

The park must obtain and furnish the employee with a copy of a written medical opinion from each examining or consulting physician which contains only the following information:

1. The physician's opinion as to whether the employee has any detected medical condition, which would place the employee at increased risk of material impairment of the employee's health from exposure to lead.
2. Any recommended special protective measures to be provided to the employee or limitations to be placed upon the employee's exposure to lead.
3. Any recommended limitation upon the employee's use of respirators, including a determination of whether the employee can wear a powered air purifying respirator if a physician determines that the employee cannot wear a negative pressure respirator.
4. The results of the blood lead determinations.

In addition, the park must instruct each examining and consulting physician to:

1. Not reveal either in the written opinion or orally, or in any other means of communication with the employer, findings, including laboratory results, or diagnoses unrelated to an employee's occupational exposure to lead.
2. Advise the employee of any medical condition, occupational or nonoccupational, which dictates further medical examination or treatment.

If therapeutic or diagnostic chelation is to be performed, the park must assure that it be done under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring and that the employee is notified in writing prior to its occurrence.

### Medical Removal and Employment Protection

Employees must be removed from work having an exposure to lead at or above the action level, consistent with 29 CFR 1910.62(k), when any of the following conditions occur:

1. Blood sampling tests indicate that the employee's blood lead level is at or above 50 ug/dl.
2. Medical determination results in a medical finding, determination or opinion that the employee has a detected medical condition, which places the employee at increased risk of material impairment to health from exposure to lead.

During the medical removal period (up to 18 months for each removal occasion), the park must maintain the total normal earnings, seniority and other employment rights and benefits of an employee, including the employee's right to his or her former job status.

The employee must be returned to their former job status when two consecutive blood sampling tests indicate that the employee's blood lead level is at or below 40 ug/dl or for an employee removed due to a medical determination, when a subsequent final medical determination results in a determination or opinion that the employee no longer has a detected medical condition, which places the employee at increased risk of material impairment to health from exposure to lead.

## Appendix E: Summary of Training Requirements

TYPE OPERATION	TYPE PERSONNEL	TYPE ACCREDITATION/CERTIFICATION REQUIRED	INITIAL TRAINING REQUIREMENT	RECERT OR REFRESHER & LENGTH	REGULATORY CITATION
Identification of lead hazards in residences and public buildings; conducting lead-based paint inspections and risk assessments	Industrial Hygienist, Safety Professional, Engineer, Environmental Specialist, Facilities Maintenance Staff	Certified Lead-based Paint Inspector; Certified Lead-based paint Risk Assessor	40 hour course (24 hour-Inspector; 16 hour Risk Assessor)	Varies with state	40 CFR 745
Identification of lead hazards, collection of bulk samples for lead identification for OSHA compliance.	Industrial Hygienist, Safety Professional, Engineer, Environmental Specialist, Facilities Maintenance Staff	None	Training sufficient to develop competencies such as Lead-based paint supervisor or project monitor courses.	Sufficient to maintain competence	29 CFR 1910.102529 CFR 1926.62
Prepare lead abatement plans for residences and public housing.	Industrial Hygienist, Safety professional, Engineer	Certified Lead-based Paint Project Designer	8 hours	Varies with state	40 CFR 745
Conducting abatement of lead-based paint in residences and public buildings.	Construction workers, maintenance personnel	Certified Lead-based Paint Worker	16-24 hours	Varies with state	40 CFR 745
Supervising or serving as competent person for abatement of lead-based paint in residences and public buildings	Construction supervisors, maintenance supervisors	Certified Lead-based Paint Supervisor or Supervisor/Project Monitor	32 hours	Varies with state	40 CFR 745
Conducting building maintenance where lead-based paint or other lead hazards exist.	Facilities maintenance staff, plumbers, electricians, carpenters	None	8 hours OSHA "action level training" for all workers exposed at or above the AL.	Annual, no specified time requirement. May vary with state.	29 CFR 1926.6229 CFR 1910.1200
Perform clearance inspection and environmental sampling at the completion of lead activities in residences and public buildings	Industrial Hygienist, Safety Professional, Engineer, Environmental Specialist, Facilities Maintenance Staff	Certified lead-based paint Inspector, certified lead-based paint risk assessor or, certified lead-based paint project monitor		Varies with state	29 CFR 745

TYPE OPERATION	TYPE PERSONNEL	TYPE ACCREDITATION/CERTIFICATION REQUIRED	INITIAL TRAINING REQUIREMENT	RE-CERT OR REFRESHER & LENGTH	REGULATORY CITATION
Perform clearance inspection at non-residential or non-public building work sites	Industrial Hygienist, Safety Professional, Engineer, Environmental Specialist, Facilities Maintenance Staff	None	Lead-based paint supervisor or lead-based paint project monitor recommended	Sufficient to maintain competence	RM50B
Employees occupying public buildings	Office Staff, other employees	None	Awareness training and information	Annual, no specified time requirement	29 CFR 1910.1200
Occupying residences	Family housing occupants	None	Disclosure and informational pamphlet	Notification prior to remodeling	40 CFR 74524 CFR 35
Competent person for non-residential or non-public buildings construction projects.	Construction supervisors, maintenance supervisors	Non	Certified lead-based paint supervisor or equivalent recommended. Training sufficient to function as construction site competent person	Sufficient to maintain competence	29 CFR 1926.6229 CFR 1926.16
Conducting custodial activities where lead-based paint or other lead hazards exist.	Facilities Maintenance staff, custodial staff, housekeepers	None	Awareness training including contents of 29 CFR 1910.1025 Appendices A & B	Annual, no specified time requirement	29 CFR 1910.120029 CFR 1910.1025
Conduct worker exposure assessment	Professional Industrial Hygienist, Safety Professional	None, Certified Industrial Hygienist, Certified Safety Professional recommended	Training sufficient to develop competence in workplace exposure assessment	Sufficient to maintain competence	29 CFR 1910.102529 CFR 1926.62
Conduct personal exposure monitoring of workers	Professional Industrial Hygienist, Safety Professional, Environmental Specialist, Facilities Maintenance Staff	None	Training sufficient to develop competence in workplace exposure monitoring procedures	Sufficient to maintain competence	29 CFR 1910.102529 CFR 1926.62

**Note:** Training, accreditation, and certification programs for lead-based paint activities required under Title X of the Toxic Substances Control Act are implemented by the states or by EPA in the absence of a state program. Parks must certify their workers in the state in which the work is to be conducted.

## **Appendix E: Guidelines for Lead Exposure at Firing Ranges**

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### Lead Dust In A Firing Range

- Exploding primers containing lead styphnate and the friction from lead slug against the gun barrel create airborne lead.
- High lead dust levels can accumulate inside indoor ranges with inadequate ventilation.
- Slugs hitting the bullet trap, walls, floors or ceiling of the range also create lead dust.
- Airborne lead dust can concentrate in outdoor ranges, depending on weather conditions.
- Spent bullets and settled dust can contaminate both indoor and outdoor ranges.
- Improperly cleaning the range also can cause settled dust to become airborne.

### You Can Take It Home With You

High levels of lead dust in firing ranges can settle on the bodies and clothes of employees and shooters. The dust can then be carried to their cars and homes, where it can be a hazard to their children.

### Other High Lead Dust Sources

Bullet loading creates a fine dust that is very difficult to clean. Melting lead to cast bullets produces a fume, which can remain airborne for several hours. The dust from these activities is readily inhaled, and can contaminate household surfaces. Never load bullets or melt lead in an unventilated area, inside the home or anywhere children may frequent.

### Steps To Minimize Lead Absorption

- Make sure the range is correctly ventilated and that the ventilation system is working properly.
- At the range, wash your hands and face before eating, drinking or smoking.
- Wash hands and face before leaving the range.

- Wash range clothes separately from the rest of the family's clothes.
- Always load bullets in a ventilated area.
- Do not load bullets in the home or in areas where children frequent.
- Do not allow children into the bullet loading area.
- Keep the bullet loading area clean by using detergent.

## **How Can Lead Dust Exposure Be Reduced?**

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### *What A Range Owner Should Do*

The Occupational Safety and Health Administration (OSHA) has established a standard for lead (29 CFR 1910.1025) which covers shooting range employees. This regulation sets a "Permissible Exposure Limit" (PEL) for airborne lead of 50 micrograms per cubic meter (mcg/m<sup>3</sup>), averaged over an eight-hour day.

However, the range owner should reduce the lead exposure to both employees and shooters to as low a level as possible.

Instructors are especially at risk because they spend more time on the firing range. The range instructor has the greatest potential long-term exposure to lead.

A separate booth, with its own tempered and filtered air supply, can be installed in the range. The construction will not reduce lead exposures to other range users, but it will reduce the range instructor's lead exposure.

An effective ventilation system produces a smooth airflow pattern. Poorly designed ventilation systems produce eddies and re-circulation that can carry fumes and dusts emitted from weapons to the area behind the firing line. Re-circulation and channeling air flow can be caused by various structures in the firing range, such as:

- Overhead barriers
- Sound barriers
- Booth walls
- Light fixtures
- Poorly located air inlets
- Even the shooters

It is very important that a ventilation system that serves the range area be completely separated from any ventilation for the rest of the building. The exhaust air from the range should not feed into air supplies for offices, meeting rooms or other businesses.

The planned use of a firing range should determine the design of the ventilation system. Improper use or maintenance of a firing range or the ventilation system can defeat the purpose of the ventilation system and increase the lead contamination.

Avoid the use of angled backstops with sand traps.

Although they are somewhat inexpensive, sand traps can generate a large amount of airborne lead dust and require frequent cleaning.

Escalator backstops and their variations, which trap bullets and their fragments, generate less dust and are easier to clean. Also, the waste lead can be sold to a recycler without having to be separated from sand.

Indoor firing ranges require frequent cleaning. Walls, floors, ceilings and bullet traps must be cleaned regularly. Frequent cleaning prevents settled dust from becoming an airborne inhalation hazard from people using the range or from air circulation.

It is essential to use appropriate methods in cleaning a firing range.

1. DO NOT DRY SWEEP!
2. Use a vacuum cleaner equipped with a high efficiency particulate air (HEPA) filter to remove lead-contaminated dust.
3. If a vacuum cleaner with a HEPA filter is not available, then a wet cleaning method must be used.
4. Anyone cleaning a range must wear appropriate protective equipment. This includes an approved respirator, protective clothing and shoes.
5. To reduce the possibility of bringing lead dust into their homes, the employees cleaning the range need to shower and change clothes before leaving the site.
6. Work clothing must be disposable or laundered separately to prevent contaminating the home.

Copper or nylon-clad bullets and non-lead primers (such as mannitol hexanitratetetracene) can significantly reduce the amount of airborne lead discharged in firing.

Sometimes, this substitution alone can reduce lead exposure to the point that no further range alterations are necessary.

In cases where it is necessary to use conventional primers, use this ammunition loaded with jacketed bullets.

### Outdoor Ranges

Airborne lead dust is a concern in outdoor ranges and can contaminate the surrounding environment. Lead dust exposure to employees or shooters can occur.

Lead contamination in an outdoor environment can occur through water runoff and from wind carrying the lead offsite. “Green bullets” such as those made from tungsten and tin may be an acceptable substitute for lead bullet, which could reduce environmental contamination and employee exposure.

The process of removing spent bullets or the face of a berm can generate large quantities of lead dust.

Bullet traps or steel backstops, similar to those constructed in indoor ranges, can be used instead of earthen backstops. Although the initial cost may be high, the spent bullets can be recovered and sold without soil removal. The trap holds the bullets and fragments, minimizing the amount of lead pollution in the soil.

## **4.10 OCCUPATIONAL MEDICAL SCREENING AND SURVEILLANCE**

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Medical screening and medical surveillance are two fundamental strategies for optimizing employee health. Although the terms are often used interchangeably, they are quite distinct concepts. Medical screening is, in essence, only one component of a comprehensive medical surveillance program. The fundamental purpose of screening is early diagnosis and treatment of the individual. Thus it has a clinical focus. The fundamental purpose of surveillance is to detect and eliminate the underlying causes such as hazards or exposures of any discovered trends. Thus it has a prevention focus. Both can contribute significantly to the success of work-site health and safety programs.

Screening is a method for detecting disease or body dysfunction before an individual would normally seek medical care. Screening tests are usually administered to individuals without current symptoms, but who may be at high risk for certain adverse health outcomes.

Surveillance is the analysis of health information to look for problems that may be occurring in the workplace that require targeted prevention. Thus it serves as a feedback loop to park management. Surveillance may be based on a single case or sentinel event, but more typically uses screening results from the group of employees being evaluated to look for abnormal trends in health status. Surveillance can also be conducted on a single employee over time. Review of group results helps to identify potential problem areas and the effectiveness of existing work-site preventive strategies.

### **National Park Service Occupational Medical Screening and Surveillance Policy**

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National Park Service work environments and occupational activities can expose personnel to hazardous chemical, physical and biological agents with the potential for disease or injury. Parks will provide occupational medical screening and surveillance to identify work-related diseases or conditions through baseline and periodic examinations at an early stage when modifying the exposure or providing medical intervention could arrest disease progression or prevent recurrences.

#### **Scope**

This section addresses criteria for inclusion of employees in medical screening and surveillance. It does not attempt to prescribe specific physical examination or testing protocols. Where agent-specific screening and surveillance protocols are prescribed by OSHA regulation or sections of DM 485 and RM50B, they will be used. This program applies to all National Park Service employees and volunteers exposed to hazardous agents. Employee medical standards and optional employee health promotion programs are not covered in this section.

## References

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1. DOI, 2000. Occupational Medicine Program Handbook.
2. DOI. 1999. Safety and Occupational Health Program. Department Manual 485.
3. 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters.
4. 29 CFR 1910.1000, Air Contaminants.
5. 29 CFR 1910.1001, Asbestos.
6. 29 CFR 1926.1101, Asbestos.
7. 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.
8. 29 CFR 1910.134, Respiratory Protection.
9. 29 CFR 1926.62, Lead in Construction.
10. 29 CFR 1910.1030, Bloodborne Pathogens.
11. 29 CFR 1910.95, Occupational Noise Exposure.
12. American Conference of Governmental Industrial Hygienists. 2003. Documentation of the Threshold Limit Values and Biological Exposure Indices.
13. American Conference of Governmental Industrial Hygienists. 2003. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

## Definitions

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*Action level (AL)* means the level of worker exposure to a hazardous agent determined by workplace exposure assessment, at or above which occupational medical surveillance examinations or screening will be performed. Action levels prescribed by OSHA will take precedence. In the absence of an OSHA-defined AL, the AL will be 50% of the most stringent of the current OSHA permissible exposure limit (PEL) or the most current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV).

*Permissible Exposure Limit (PEL)* means the employee's permitted exposure to any material listed in Tables Z-1, Z-2 or Z-3 of OSHA regulation 29 CFR 1910.1000.

*Threshold Limit Value (TLV)* means the airborne concentration of a substance that represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. TLVs are recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH).

*Time-Weighted Average (TWA)* means the concentration of a stressor or hazard, which has been averaged for the time duration of the sample. It is most commonly expressed as an average concentration for a normal eight-hour workday.

*Emergency Exposure* means any occurrence, such as, but not limited to, equipment failure, rupture of containers or failure of control equipment, that may result in an unexpected release and exposure to a hazardous substance or condition.

## **Program Elements**

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1. *Assess Worker Exposures.* Occupational exposure assessment (Section 4.1) and job hazard analysis (Section 3.1) of workplaces shall be conducted to identify all potential exposures and other worker safety and health risks, and establish complete workplace exposure profiles.
2. *Identify Workers Requiring Medical Screening or Surveillance.* There are three methods for identifying workers at risk of work-related health problems and determining who will be provided medical screening or surveillance. They are: by job title, by workplace or task, and by individual exposure.
  - a. Job titles and job descriptions can be used to characterize the basic tasks, hazardous exposures and health outcomes likely to be experienced by the majority of workers in a specific occupational group. This type of grouping assumes that all workers will have similar job demands, experience similar stresses, have the same exposures to hazardous agents and suffer the same health effects. One example of such a grouping may be all workers serving as members of a hazardous materials spill response team. Table 4.X-1 lists occupational groups for which medical screening and surveillance must be provided.

**Table 4.X-1 Occupational Groups Requiring Medical Screening or Surveillance**

HAZARD	REFERENCE	MEDICAL SURVEILLANCE CRITERIA	EXAM TYPE AND FREQUENCY*
Hazardous Waste Site Workers & Emergency Responders	• 29 CFR 1910.120	All Employees at risk for exposure: • Above PEL > 30 days • If no PEL exp > 30 days • If Respirator used • Possible Overexposure • Hazmat Team Members	• Initial Baseline • Annual Periodic • Emergency Exposure • Termination of Exposure
Respiratory Protection	• 29 CFR 1910.134 • RM 50B, Sec 4.3	• All workers wearing respirators	Initial Medical Clearance Periodic (see Section 4.3 and OSHA standard for additional information)

\*See OSHA Standard for further information. \*\*See NFPA 1582 for further information.

- b. Individual exposures are determined during industrial hygiene exposure assessment or workplace monitoring that quantifies job demands, stresses and hazardous exposures for each individual. For example, personal breathing zone samples collected during an industrial hygiene survey of a spray-painting task that is normally conducted once a week showed exposure consistently greater than the AL.
- c. Hazardous agents present in the workplace can be characterized during exposure assessment and job hazard analysis. Based on the workplace or task assessment, an assumption may be made that all workers assigned to that workplace or task are potentially exposed to the levels of hazards found at the time the workplace was evaluated. For example all tree crew workers are likely to be routinely exposed to hazardous noise greater than the AL. Tables 4.X-2 and 4.X-3 provide summary lists of regulated hazardous agents requiring medical screening and surveillance of exposed employees.

**Table 4.X-2 OSHA Regulated Chemical Agents Requiring Medical Surveillance or Screening\***

HAZARDOUS CHEMICAL	REGULATION	MEDICAL SURVEILLANCE CRITERIA	EXAM TYPE & FREQUENCY
Arsenic-Inorganic	• 29 CFR 1910.1018	Exposure at or above the AL for more than 30 days per year without regard to respirator use**	• Initial Baseline Periodic** • Emergency Exposure • Termination of Exposure • Termination of Employment
Asbestos	• 29 CFR 1910.1001 • 29 CFR 1915.1001 • 29 CFR 1926.1101 • RM 50B Sec 4.X	Exposure at or above PEL 30 days per year	• Initial Baseline • Annual Periodic
Benzene	• 29 CFR 1910.1028	Employees exposed: • at or above AL 30 days/year • at or above PEL 10 days/year • at or above 10 PPM 30 days/year prior to 1987 • to >0.1% benzene solvent as tire building machine operators	• Initial Baseline • Annual Periodic** • Emergency Exposure
Cadmium	• 29 CFR 1910.1027	Employees who are or may be exposed: • at or above AL 30 days/ year • previous exposure above AL total of 60 months	• Initial Baseline • Periodic** • Emergency Exposure • Termination of Exposure**
Ethylene Oxide	• 29 CFR 1910.1047	For all employees who are or may be exposed at or above AL >30 days/year	• Initial Baseline • Annual Periodic • Emergency Exposure • Termination of Exposure • Termination of Employment
Formaldehyde	• 29 CFR 1910.1048	All employees exposed at or above AL or exceeding the STEL	• Initial Baseline • Annual Periodic • Emergency Exposure
Lead	• 29 CFR 1910.1025 • 29 CFR 1926.62 • RM 50B, Sec X	Employees who are or may be exposed above the AL for 30 days/year	• Initial Baseline • Periodic** • Emergency Exposure
Organophosphate & Carbamate Pesticides	• 29 CFR 1910.1000	For all employees who are or may be exposed at or above AL >30 day/year	• Initial Baseline • Quarterly Periodic • Emergency Exposure

\*This table reflects chemical agents to which NPS employees are most likely to be exposed. It does not provide a complete listing of OSHA-regulated chemicals. See 29 CFR 1910.1000, Tables Z1, Z2 and Z3 for a complete list of regulated chemicals.

\*\*See OSHA Standard for further information.

**Table 4.X-3 OSHA Regulated Physical and Biological Agents Requiring Medical Surveillance or Screening**

HAZARD AGENT	REFERENCE	MEDICAL SURVEILLANCE CRITERIA	EXAM TYPE & FREQUENCY
Bloodborne Pathogens	• 1910.1030 • RM 50B, Sec 4.	Employees occupationally exposed blood or OPIM during an exposure incident	• Emergency Exposure
Noise	• 1910.95 • RM50 B, Sec 4.2	When Noise Exposure is 85 dBA 8 hr TWA or greater	• Initial Baseline • Annual Periodic • Termination of Exposure
Heat Stress	• RM50B, Sec 4.X	Employees exceeding heat stress screening criteria	• Periodic during exposure

### 3. *Provide Medical Screening and Surveillance.*

Parks will provide medical screening and surveillance to all employees who meet applicable criteria. Mandated medical surveillance requirements for each of the OSHA-regulated programs are listed in the applicable OSHA standards. Additional tests and evaluations may be required at the discretion of the physician or healthcare professional consistent with sound medical practice.

OSHA Regulation 29 CFR 1910.1000 contains the Z Tables that list stressors that have permissible exposure limits (PELs). Some of these stressors have specific regulations that mandate medical surveillance requirements. The remainder of these stressors do not have any medical surveillance requirements put forth in specific regulations. Parks with employees exposed to these stressors above the action level (AL) are required to perform medical surveillance examinations. The scope of these medical screening examinations will be determined by the examining physician based on the nature and extent of exposure of the worker.

The following list summarizes factors to be considered when determining examination content and developing examination protocols.

- Specific job tasks and/or requirements.
- Workplace risk factors (exposures).
- Physical agents.
- Chemical agents.
- Biological agents.
- Other.
- Personal risk factors (medical status).
- Target organ systems and potential health risks.
- Potential public health and safety impact.
- Legal and regulatory requirements.
- Employee health promotion and personnel programs.

### Types of Evaluation

*Initial or Baseline.* These evaluations are performed before placement in a specific job to assess whether the worker will be able to perform the job capably and safely and to obtain baseline measurements for future comparison. Ideally, these medical evaluations should be done before commencement of work.

*Periodic.* These evaluations are conducted at scheduled intervals. Periodic examinations may include an interval history, physical examination and clinical and biological screening tests. The scope of these examinations is determined by regulatory guidance and professional healthcare practice standards.

*Emergency (Acute) Exposure.* These evaluations are required when the applicable short-term exposure limit (STEL) or ceiling limit of a substance is exceeded. The requirement applies whether or not the worker exhibits any overt symptoms of acute exposure. Emergency exposure evaluations are also required when a worker exhibits adverse effects following an acute exposure to a suspected hazardous substance.

*Termination of Exposure.* These evaluations are performed when exposure to a specific hazard has ceased. Exposure to specific hazards may cease when a worker is reassigned, a process is changed or the worker leaves employment. Some federal regulations require termination of exposure examinations (e.g., Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120).

*Termination of Employment.* These evaluations are designed to assess pertinent aspects of the worker's health when the employee leaves employment. Documentation of examination results may be beneficial in assessing the relationship of any future medical problems to an exposure in the workplace. This is particularly applicable to those conditions that are chronic or that may have long latency periods. Some federal regulations require termination-of-employment evaluations (e.g., asbestos, 29 CFR 1910.1001).

### Medical Opinions

A medical examination alone cannot determine an individual's ability to perform the essential duties of a particular position. The responsibility for making this determination rests solely with the park management. Medical information may be an essential element in determining an individual's suitability for job tasks. However, management has the obligation to consider issues that are not strictly medical, such as reasonable accommodation or assessment of undue hardship on the operation of park operations.

The role of medical personnel is limited to determining whether the individual meets the medical requirements of the position and can, from a medical standpoint, perform the job capably and safely. Medical determinations should fall in one of the following three categories.

*Qualified.* The worker is capable, from a medical standpoint, of performing the required tasks. Allowing the individual to perform the job will not pose a significant risk to personal health and safety or the health and safety of others.

*Qualified with Restriction.* The worker is capable of performing the job without risk to personal health or others only with some accommodation or restriction. When this determination is made, the examining healthcare practitioner should provide a list of recommended accommodations or restrictions and the expected duration of their application.

*Not Qualified.* The worker is not capable of performing essential tasks or cannot perform them safely.

4. *Inform Workers of the Results.* All workers must be informed of the results of their occupational medical screening and surveillance evaluations, even if all results are normal, as soon as possible. OSHA is very specific with regard to informing employees. For example, employees must be notified in writing within 21 days if a significant threshold shift is detected. Results of blood tests for lead must be provided to the employee within five days of the park receiving analysis results. In the absence of specific regulated notifications, workers will be informed of the results of evaluations no later than 30 days after they are received by the park. Documentation of patient notification should be noted in the medical record. All personnel with significant abnormalities must be further evaluated or referred for evaluation as appropriate. One of the primary reasons for performing occupational medical examinations is to detect job-related abnormalities at an early stage to reverse or halt progression by modifying exposure. If abnormalities are not fully evaluated and reviewed, potential opportunities for prevention are lost.

#### 5. *Medical Removal and Protections.*

It is the responsibility of the park to ensure a safe and healthy working environment. Once a work-related illness or injury is identified that could be further exacerbated by continued exposure to a workplace hazard or condition, immediate evaluation is required to determine whether the worker must be at least temporarily removed from further exposure. Removal from a workplace or restriction from job tasks is warranted under the following conditions:

- A medical condition prevents the worker from performing the essential functions of the job and no reasonable accommodation would enable the worker to perform the job.
- Allowing the worker to perform the job would endanger the health or safety of other workers or the public.
- Placing or retaining the individual in the job poses a significant risk to the worker's personal health or safety.

The examining practitioner should prepare a case summary on all workers determined to be medically unsuited for their job and file this case summary in the workers' medical records. The appointing official must be informed of the disqualifying recommendation. The case summary, as confidential medical information, should be provided to management only when necessary and authorized. The following information should be included in all case summaries:

1. *Diagnosis.* The diagnosis must be justified in accordance with established diagnostic criteria.
2. *History.* The history of the disqualifying condition(s) including references to findings from previous examinations, treatment and responses to treatment.
3. *Clinical findings.* The clinical findings including results of any laboratory tests, X-rays or special evaluations performed.
4. *Prognosis.* The prognosis must clearly state the medical basis for concluding that the individual is incapable or unsafe, plans or recommendations for future treatment, and an estimate of the expected date of full or partial recovery. If recovery is not expected, this should also be clearly indicated. The prognosis must also include an explanation of the impact of the medical condition on overall activities both on and off the job, the reasons why restrictions or accommodations will not enable the individual to perform the job, and an explanation of the medical basis for any conclusions.

Examples of medical conditions which support the removal of the worker are:

For workers exposed to benzene, any of the following:

- The hemoglobin/hematocrit falls below the laboratory's normal limit and/or these indices show a persistent downward trend from the individual's pre-exposure norm (provided these findings cannot be explained by other means).
- The thrombocyte (platelet) count varies more than 20% below the employee's most recent prior values or falls below the laboratory's normal limit.
- The leukocyte count is below 4,000 per mm<sup>3</sup> or there is an abnormal differential count.

For workers exposed to lead: A blood lead level at or above 50 ug/dl of whole blood.

For workers exposed to noise: A loss of hearing of > 25 dB in either ear at one or more of the speech frequencies (500, 1000, 2000 or 3000 Hz), compared with the current reference audiogram.

For workers exposed to organophosphate pesticides: cholinesterase level at or below 50% of the pre-exposure baseline.

Pregnancy is not a reason for automatic medical removal from the workplace. A decision to remove or restrict a pregnant woman must be based on sound clinical judgment after careful consideration of the workplace environment and the woman's physical capabilities. The woman's prenatal healthcare provider should be apprised early of potential workplace hazards and available safety precautions.

## 4.11 INDOOR ENVIRONMENTAL QUALITY

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### National Park Service Indoor Environmental Quality Policy

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Parks shall maintain indoor employee workplaces free from recognized environmental health hazards that are likely to cause illness by establishing management systems to prevent or mitigate them.

Scope: This section provides summary guidance for the anticipation, identification and evaluation of indoor environmental quality (IEQ) problems and for the development of management systems to prevent or mitigate them. The guidance will find application in all buildings owned or managed by the park, including places of work and residence. In addition, it provides a framework for coordinating IEQ issues in buildings not owned or managed by the park, but occupied by park employees.

### References

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1. ASHRAE 55-1992. *Thermal Environmental Condition for Human Occupancy*.
2. ASHRAE 62-2001 and Addenda. *Ventilation for Acceptable Indoor Air Quality*.
3. EPA/ NIOSH. 1991. *Building Air Quality: A Guide for Building Owners and Facility Managers*. EPA Doc. Ref. No. 402-F-91-102/DHHS NIOSH Pub No. 91-114.
4. EPA. 1995. *The Inside Story: A Guide to Indoor Air Quality*. EPA Doc. No. 402-K-93-007.
5. EPA. 2001. *Mold Remediation of Schools and Commercial Buildings*. EPA 402-K-D-0-01.
6. Lstiburek, J. and J. Carmody. 1994. *Moisture Control Handbook, Principles and Practices of Residential and Small Commercial Buildings*. John Wiley, New York. 214 pp.
7. Macher, J. Ed. 1999. *Bioaerosols, Assessment and Control*. ACGIH. Cincinnati.
8. New York City Department of Health, 2000. *Guidelines on Assessment and Remediation of Fungi*.

### Principles

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The development of indoor environmental quality problems and their prevention and mitigation is dependent on four factors. They are: 1. the sources of pollution, 2. the building's heating ventilation and air conditioning (HVAC) systems, 3. pollutant pathways and 4. exposed occupant population.

## Pollutant Sources

There must be a source of contamination or discomfort. The source may be external or internal and may be within the mechanical systems of the building. Table 1 lists common IEQ pollution sources.

**Table 1. Common Sources of Indoor Air Pollution**

Outside	<ul style="list-style-type: none"><li>• Contaminated outdoor air (pollen, dust, fungal spores, industrial pollutants)</li><li>• Emissions (vehicle exhaust, loading docks, garbage odors, re-entrained boiler exhaust)</li><li>• Soil gas (radon, leaking underground fuel tanks, previous uses of the property such as landfills, pesticides)</li><li>• Moisture or standing water promoting excess microbial growth</li></ul>
HVAC System	<ul style="list-style-type: none"><li>• Dust or dirt in ductwork</li><li>• Microbial growth in drip pans, humidifiers, ductwork, coils</li><li>• Improper venting of combustion products</li><li>• Refrigerant leakage</li></ul>
Other Equipment	<ul style="list-style-type: none"><li>• Emissions from office equipment (volatile organic compounds, ozone)</li><li>• Supplies (solvents, toners, ammonia)</li><li>• Emissions from shops, labs, cleaning processes</li><li>• Elevator motors and other mechanical systems</li></ul>
Human Activities	<ul style="list-style-type: none"><li>• Personal activities (smoking, cooking, body odor, cosmetic odors)</li><li>• Housekeeping activities (cleaning materials and procedures, emissions from stored supplies or trash, use of deodorizers and fragrances, airborne dust circulated by sweeping or vacuuming)</li><li>• Maintenance activities (volatile organic compounds from paint, caulk, adhesives, pesticides, stored supplies)</li></ul>
Building Components & Furnishings	<ul style="list-style-type: none"><li>• Locations that produce or collect dust or fibers (carpeting, curtains and textiles, open shelving, old or deteriorated furnishings, materials containing damaged asbestos)</li><li>• Unsanitary conditions and water damage (microbial growth in or on soiled or water-damaged furnishings, microbial growth in areas of surface condensation, standing water from clogged or poorly designed drains, dry traps that allow the passage of sewer gas)</li><li>• Chemicals released from building components or furnishings (volatile organic compounds, inorganic compounds)</li></ul>
Other Sources	<ul style="list-style-type: none"><li>• Accidental events (spills, microbial growth due to flooding or leaks, fire damage)</li><li>• Special use and mixed-use areas (laboratories, smoking areas, art rooms, print shops, exercise rooms, food preparation areas)</li><li>• Redecorating, remodeling or repair activities (emissions from new furnishings, dust and fibers from demolition, odors and volatile organic and inorganic compounds from paint, caulk, adhesives, microbes released from demolition or remodeling activities)</li></ul>

### Heating Ventilation and Air Conditioning Systems

HVAC systems are designed to provide thermal comfort, distribute adequate amounts of outdoor air to meet ventilation needs of all building occupants, and isolate and remove odors and contaminants through pressure control, filtration and exhaust fans. Therefore, HVAC systems play an important role in controlling IEQ problems and must be properly maintained and operated as designed.

A recurring problem in NPS facilities is the lack of consideration of HVAC system functions during remodeling or renovation. Frequently, the result is that the HVAC system is no longer able to adequately control the indoor environment.

### Pollutant Pathways

Pollutant pathways connect the source to the occupant of the building. Pathways generally involve the HVAC systems. Air movement within the HVAC system and the building is driven by pressure differentials and accounts for contaminant distribution patterns.

### Occupants

Building occupants may have different tolerances as well as expectations for air quality. Some occupants may be particularly susceptible to effects of indoor air contaminants and include those with allergies or asthma, respiratory disease and compromised immune systems as a result of chemotherapy, radiation therapy or disease. This may also include contact lens wearers.

## **Indoor Air Pollution and Health**

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Health effects from indoor air pollutants may be experienced soon after exposure or, possibly, years later.

### Immediate Effects

Immediate effects may show up after a single exposure or repeated exposures. These include irritation of the eyes, nose and throat, headaches, dizziness and fatigue. Such immediate effects are usually short-term and treatable. Sometimes the treatment is simply eliminating the person's exposure to the source of the pollution if it can be identified. Symptoms of some diseases, including asthma, hypersensitivity pneumonitis and humidifier fever, may also show up soon after exposure to some indoor air pollutants.

The likelihood of immediate reactions to indoor air pollutants depends on several factors. Age and preexisting medical conditions are two important influences. In other cases, whether a person reacts to a pollutant depends on individual sensitivity, which varies tremendously from person to person. Some people can become sensitized to biological pollutants after repeated exposures, and it appears that some people can become sensitized to chemical pollutants as well.

Certain immediate effects are similar to those from colds or other viral diseases, so it is often difficult to determine if the symptoms are a result of exposure to indoor air pollution. For this reason, it is important to pay attention to the time and place symptoms occur. If the symptoms fade or go away when a person is away from the workplace, for example, an effort should be made to identify indoor air sources that may be possible causes. Some effects may be made worse by an inadequate supply of outdoor air or from the heating, cooling or humidity conditions prevalent in the building.

Other health effects may show up either years after exposure has occurred or only after long or repeated periods of exposure. These effects, which include some respiratory diseases, heart disease and cancer, can be severely debilitating or fatal. It is prudent to try to improve the indoor environmental quality in buildings and homes even if symptoms are not noticeable.

## **Program Elements**

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1. *Designate an IEQ Manager.* Designate an IEQ manager responsible for overall indoor environmental quality. Specific responsibilities of the IEQ Manager might include:
  - Developing an IEQ profile.
  - Ensuring communication with occupants about IEQ issues.
  - Coordinating staff activities.
  - Ensuring adequate operating manuals, standard procedures and staff training.
  - Reviewing major projects in the building for their IEQ implications.
  - Reviewing contacts, such as those for cleaning services and pest control, which could create IEQ problems.
  - Periodically inspecting the building for indicators of IEQ problems.
  - Managing IEQ records.
  - Responding to complaints or observations regarding IEQ problems, including an initial walk-through investigation.

2. *Identify Pollutant Sources and Pathways.* One useful approach is to develop an IEQ profile for the building. An IEQ profile will answer basic questions about the building's current condition, including its function, use patterns, furnishings, mechanical equipment and changes since its original design and construction. It will identify conditions that are, or could be, contributing to IEQ problems and will provide the basis for developing building management strategies and procedures for good indoor environmental quality. Steps for conducting an IEQ profile are summarized in Table 2.

**Table 2. Steps for Conducting an IEQ Profile**

STEP	PROCEDURES	PRODUCTS
Collect and review existing records	<ul style="list-style-type: none"> <li>• Review design, construction and operating documents</li> <li>• Check HVAC maintenance records against equipment lists</li> <li>• Review complaint record</li> </ul>	<ul style="list-style-type: none"> <li>• Description of HVAC system design and operation; set of operating instructions, manuals</li> <li>• Set of maintenance and calibration records</li> <li>• Inventory of locations where occupancy, equipment or building has changed</li> </ul>
Conduct walk-through inspection of the building	<ul style="list-style-type: none"> <li>• Talk with staff and other occupants</li> <li>• Look for IEQ problem indicators</li> <li>• HVAC system condition and operation</li> </ul>	<ul style="list-style-type: none"> <li>• List of responsible staff or contractors; evidence of training; job descriptions</li> <li>• Identification of areas where positive or negative pressures should be maintained (sketched plan)</li> <li>• Record of locations that need monitoring or correction</li> </ul>
Collect detailed information	<ul style="list-style-type: none"> <li>• Pollutant pathways</li> <li>• Pollutant sources</li> <li>• Occupants</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory of HVAC system components needing repair, adjustment or replacement</li> <li>• Record of control settings and operating schedules</li> <li>• Completed plan showing airflow direction or pressure differentials in significant areas</li> <li>• Inventory of significant pollutant sources and their locations</li> <li>• Set of Material Safety Data Sheets for supplies and hazardous substances that are stored or used in the building</li> </ul>

If IEQ problems are identified as a result of conducting the IEQ profile, they should be investigated and mediated.

3. *Managing Buildings for Good Indoor Environmental Quality.* Most IEQ problems can be prevented by implementing a good building management system. Successful management systems will attend to the operation and maintenance of equipment, including the HVAC system. Some examples include adequate ventilation; isolation of contaminants through building air pressure management; inspections; controlling the purchase, inventory and storage of materials; preventive maintenance of the structure, its equipment and furnishings; managing housekeeping schedules, cleaning materials and trash disposal; managing pest control activities; managing a system for review of renovation, redecorating and remodeling plans; and occupant communications and relations.

#### 4. Investigating IEQ Complaints and Problems.

The source of many IEQ complaints can be identified by an initial walk-through inspection and discussion with occupants and staff. The cause of a problem is frequently associated with a change in the building or its mechanical systems or uses. It is usually related to management system failures.

Obvious causes of IEQ problems should be corrected and may not require further investigation. Less apparent causes and contributors will require further examination. Investigations of IEQ problems or complaints generally follow the sequence summarized in Table 3.

**Table 3. Steps for Conducting an IEQ Investigation**

Step 1	Initial walk-through	• Visual inspection • Talk with occupants and staff Note: If initial walk-through provides an explanation, go directly to Step 4: Attempt Control
Step 2	Collect additional Information	• Interview building occupants • Evaluate HVAC system • Identify pollutant pathways and sources • Conduct environmental sampling if needed
Step 3	Develop hypotheses to explain the problem	• Test these hypotheses by manipulating building conditions or exposure, or by performing appropriate tests Note: If tests support the hypotheses, go to Step 4: Attempt Control. If not, return to Step 2
Step 4	Attempt a control strategy	Note: If controls fail to solve the problem, return to Step 2
Step 5	Make changes in management system to ensure the problem does not recur	

Additional guidance for the investigation of fungi (molds) problems in buildings is provided in Appendix A.

## Appendix A: Guidance for the Investigation of Mold Complaints

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Because of a history of misinterpreting data, drawing conclusions and making recommendations on limited air sampling data, the IEQ profession does not generally recommend air sampling as a screening tool to determine whether a mold exposure problem exists in a building. The ubiquitous nature of molds in the environment, the lack of an established exposure limit, and the unclear link between exposure level and health effects makes interpreting the data difficult if not impossible. Precisely because of these problems with interpreting sampling data, IEQ professionals are now relying on visible inspection of workplaces and not on sampling data.

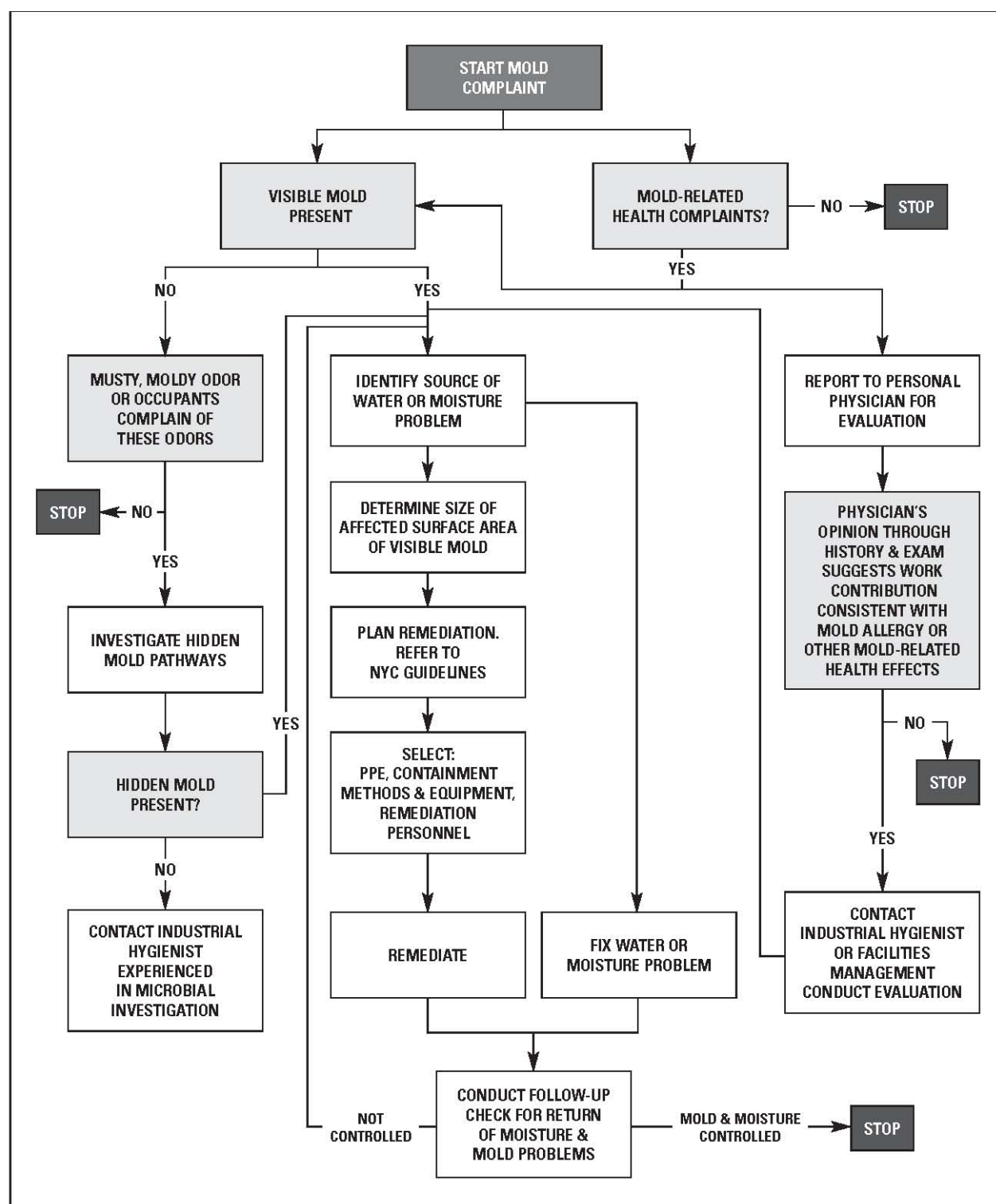
In the last few years, a new industry has emerged in assessments and remediation of buildings with mold contamination. This was fueled by the assumption that the presence of any mold in a building was a health hazard requiring extensive sampling and mitigation using asbestos abatement techniques. The public quickly became alarmed about these toxic molds, particularly the genus *Stachybotrys*. Scientists are now realizing that this reaction is not supported by scientific studies and in most cases air sampling does little to solve the problem.

While the “toxic mold” phenomenon gained momentum, two agencies primarily responsible for guidance on epidemiology (CDC) and remediation (NYC Dept of health) quietly re-evaluated the issue and recently released dramatically different recommendations. After intensive analysis of the data by review panels, the CDC stated the following:

- Mold potentially containing mycotoxins (e.g., *Stachybotrys*) present the same health risk as other common building molds.
- Mold growth in buildings can generally be controlled with simple procedures such as wiping with bleach solution and removing contaminated materials.

The amount of detail and precaution required for mitigation should be determined on a site-specific basis. This can be accomplished in the majority of cases by in-house personnel when equipped with appropriate guidance. Those planning such control or remediation work should follow protocols and requirements presented in New York City Department of Health, 2000, *Guidelines on Assessment and Remediation of Fungi*. Except for the most complex or controversial situations, microbial sampling and on-site “experts” need not be a necessary part of the equation. Figure X.A.1 provides a flow chart to assist IEQ managers in decisions regarding mold investigations.

Figure X.A.1: Mold Investigation Decision Guide



## 4.12 RADIATION PROTECTION

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RESERVED

## 4.13 HEAT INJURY PREVENTION

### National Park Service Heat Injury Prevention Policy

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Heat-induced occupational illness, injury and reduced productivity occur in situations in which the total heat load (environmental plus metabolic) exceeds the body's capacity to maintain normal body functions without excessive strain. The reduction of adverse health effects shall be accomplished by: the proper application of engineering and work practice controls, worker training and acclimatization, measurements and assessment of heat stress, medical supervision, and proper use of heat-protective clothing and equipment.

Parks shall establish a system to assess heat stress, alert employees of increased risk of heat strain and implement control measures adequate to prevent heat-strain injuries. A tiered system that begins with a broad heat-stress-screening index and becomes progressively more detailed as needed to address task specific risks will be most efficient.

#### Definitions

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1. *Heat Stress* is the net heat load to which a worker may be exposed from the combined contributions of metabolic heat generated during work, environmental factors (air temperature, humidity, air movement and radiant heat) and clothing requirements.
2. *Heat Strain* is the overall physiological response resulting from heat stress.

Scope: This program applies to all employees and volunteers who may be exposed to excessive heat strain.

#### References

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1. Heat Stress and Heat Strain in: 2002. ACGIH. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, ACGIH.
2. Occupational Exposure to Hot Environments, Revised Criteria Document, 1986, NIOSH.

#### Program Elements

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1. *Establish a Heat Stress Alert System.* Parks shall establish an alert system to identify and alert employees to environmental conditions that pose increased potential for heat stress.
2. *Conduct Heat Stress Screening.* Evaluate work-site and task-specific heat stress. Use the Wet Bulb Globe Temperature (WBGT) Index and Heat Stress Exposure Screening Criteria when the Heat Stress Alert system (Program element 1, above) has identified conditions of increased potential for heat stress.

3. *Conduct Personal Medical (Physiological) Surveillance.* Institute medical physiological surveillance for all workers required to operate under conditions that exceed Heat Stress Exposure Screening Criteria (Program element 2, above).
4. *Implement General Heat Stress Controls.* General heat stress controls shall be implemented when a heat stress alert has been issued and whenever elevated heat stress conditions exist or are anticipated.
5. *Implement Task-Specific Heat Stress Controls.* Task-specific controls consisting of engineering controls, administrative controls and use of personal protective clothing and equipment shall be implemented when Heat Stress Screening Criteria (Program Element 2) are exceeded or when work must be conducted in clothing that restricts vapor and heat loss.
6. *Train Employees.* Train supervisors and other employees in the causes and recognition of illness, personal care procedures to minimize risk, proper care and use of heat-protective clothing and equipment, and the effects of non-occupational factors on tolerance to occupational heat stress.

## Heat Injury Prevention Program Implementation Action Items

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- Step 1 ☐ Establish a “Heat Stress Alert System” using the NOAA Heat Index (HI) (Apparent Temperature). Appendix A explains the use of the HI system. Assign individual(s) responsible for determining heat stress index. When the index is 105°F or greater, alert employees, initiate work-site and task-specific environmental (WBGT) and metabolic heat screening (step 2), and implement control measures (step 3).
- Step 2 ☐ Conduct heat stress screening. Evaluate work-site and task-specific heat stress by determining the WBGT Index. Characterize worker activity to determine metabolic heat stress; then compare with the Heat Stress Screening Criteria to determine risk. Determination of the WBGT Index and use of the screening criteria are described in Appendix B.
- Step 3 ☐ Conduct personal medical (physiological) surveillance. Medical surveillance must be conducted for all workers required to work under conditions that exceed the Heat Stress Exposure Screening Criteria (WBGT). Physiological parameters are monitored to determine whether heat strain experienced by the employee is excessive. Medical surveillance is discussed in Appendix C.
- Step 4 ☐ Implement General Heat Stress Controls. General controls must be implemented when heat stress is elevated and the risk of excessive heat strain exists. Elevated heat stress conditions occur when the HI is 105°F or greater and when the WBGT Heat Stress Screening Criteria are exceeded, but may also exist for certain individuals and circumstances. General controls are described in Appendix D.
- Step 5 ☐ Implement Task-Specific Controls. When screening criteria are exceeded and general controls are not sufficient to prevent excessive heat strain, engineering and administrative controls must be developed and implemented. The use of personal protective clothing and equipment must also be implemented.
- Step 6 ☐ Train employees. Train supervisors and other employees in the causes and recognition of illness, personal care procedures to minimize risk, proper care and use of heat-protective clothing and equipment, and the effects of non-occupational factors on tolerance to occupational heat stress. Refer to Appendix E for a summary of important training points that should be included — heat-related illness, recognition, predisposing factors, physiological nature of the illness, first aid and prevention.

## **Technical Appendices**

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Appendix A: Heat Stress Alert Systems

Appendix B: Heat Stress Screening Criteria

Appendix C: Medical Surveillance

Appendix D: Controlling Heat Strain

Appendix E: Signs and Symptoms of Heat Strain and First Aid Procedures

## **Appendix A: Heat Stress Alert System — Heat Index (Apparent Temperature)**

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Parks shall establish a Heat Stress Alert System to easily identify and anticipate environmental conditions that may result in an increased heat stress potential. The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) Heat Index Program provides a convenient mechanism for initial screening of heat stress potential for a general locale.

The NWS system utilizes an index called the "Apparent Temperature Index" or "Heat Index." The index provides a measure of environmental heat on an area basis. It is calculated from the air temperature and the relative humidity.

The NWS will issue advisories or warnings via special weather statements, releases to the media and NOAA's Weather radio programming when the Heat Index (HI) is expected to have a significant impact on public safety. A common guideline for the issuance of excessive heat alerts is when the maximum daytime HI is expected to equal or exceed 105°F and the nighttime minimum HI is expected to equal or exceed 80°F for two or more consecutive days.

Some regions and municipalities are more sensitive to excessive heat than others. Cities pose special hazards because stagnant atmospheric conditions may trap pollutants in urban areas and add the stresses of severe pollution to the already dangerous stresses of hot weather.

### **Calculating the Heat Index.**

Parks may determine the heat index value for their locale by referring to the Heat Index chart below and using the forecast or measured temperature and relative humidity values. Or the heat index may be calculated online at <http://www.crh.noaa.gov/lx/calc.htm>.

		RELATIVE HUMIDITY (%)															
AIR TEMPERATURE	°F	40	45	50	55	60	65	70	75	80	85	90	95	100			
	110	136															
	108	130	137														
	106	124	130	137													
	104	119	124	131	137												
	102	114	119	124	130	137											
	100	109	114	118	124	130	136										
	98	105	109	113	117	123	126	134									
	96	101	104	108	112	116	121	126	132								
	94	97	100	103	106	110	114	119	124	129	135						
	92	94	96	99	101	105	108	112	116	121	126	131					
	90	91	93	95	97	100	103	106	109	113	117	122	127	132			
	88	88	89	91	93	95	98	100	100	106	110	113	117	121			
	86	85	87	88	89	91	93	95	97	100	102	105	108	112			
	84	83	84	85	86	88	89	90	92	94	96	98	100	103			
	82	81	82	83	84	84	85	86	88	89	90	91	93	95			
	80	80	80	81	81	82	82	83	84	84	85	86	86	87			

**WITH PROLONGED EXPOSURE AND/OR PHYSICAL ACTIVITY**

- Extreme Danger**  
Heat Stroke or sunstroke highly likely
- Danger**  
Sunstroke, muscle cramps, and/or heat exhaustion likely
- Extreme Caution**  
Sunstroke, muscle cramps, and/or heat exhaustion possible
- Caution**  
Fatigue possible

To find the Heat Index, look at the Heat Index Chart. For example, if the air temperature is 95°F (found on the left side of the table) and the relative humidity is 55% (found at the top of the table), the HI — or how hot it really feels — is 110°F. This is at the intersection of the 95° row and the 55% column.

An HI of 105°F or greater corresponds with environmental conditions that may cause increasingly severe heat disorders with continued exposure and/or physical activity. At this level, general heat stress controls must be implemented.

Remember that this is a coarse index of environmental heat stress and does not factor site-specific environmental conditions, metabolic heat stress, general health of workers or other predisposing factors. Heat Index values were devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous. Therefore, if continued exposure and physical activity are required, a work-site and task-specific screening evaluation using the Heat Stress Screening Criteria and the WBGT Index must be conducted (see Appendix B).

## Appendix B. Heat Stress Screening Criteria Using the WBGT Index

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Once an elevated heat stress potential has been determined by use of the HI, general controls must be implemented (see Appendix D) and further evaluation must be conducted to determine the environmental and metabolic heat load of the employee specific to the work site and the task. This is done using the Heat Stress Screening Criteria and the Wet Bulb Globe Temperature (WBGT) Index<sup>1</sup>.

WBGT is an index of environmental heat load, which considers the combined contribution of ambient temperature, wind, relative humidity and solar energy gains. To obtain an estimate of worker heat stress, the WBGT must be adjusted to account for the contributions of physical work activity (metabolic heat), clothing and employee acclimatization.

Here is how Heat Stress Screening Criteria are used with the WBGT Index:

### Step 1

*Measure Environmental Heat.* Use a WBGT meter to assess environmental heat and determine the WBGT Index. The WBGT meter will provide three temperature measurements. The natural wet bulb temperature provides an indication of the effects of relative humidity, wind speed and evaporative cooling on the body. The globe temperature provides an indication of solar heat gains, while the dry bulb temperature factors the impact of the heat in ambient air. Additions are made to the WBGT value for some clothing ensembles (see Table B1).

**Table B1. Additions to WBGT Values for Some Clothing Ensembles**

CLOTHING TYPE	WBGT ADDITION
Summer work uniform*	0
Cloth (woven material) overalls	Add 6°F
Double-cloth overalls	Add 9°F

\*Traditional work uniform consisting of a long-sleeved shirt and pants.

The WBGT Index is calculated as follows:

$$\text{WBGT Index} = 0.7 \text{ Tnwb} + 0.2 \text{ Tg} + 0.1 \text{ Tdb} + \text{Clo}$$

Where      Tnwb = natural wet bulb temperature  
              Tg = globe temperature  
              Tdb = dry bulb (air) temperature  
              Clo = clothing value

<sup>1</sup> Heat Stress and Heat Strain in: 2002. ACGIH. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, ACGIH.

Sensors should always be located so that the readings obtained will be truly representative of the environmental conditions to which the worker is exposed. In locating the meter, consider worker height, radiation sources and direction of air movement. Allow sufficient time for thermometer equilibration before taking readings.

One-hour time-weighted averages may be used when work and rest environments are different. For example,  $[(\text{WBGT at work site} \times 45 \text{ minutes}) + (\text{WBGT in air conditioned building during rest} \times 15)]/60 = \text{TWA}$ .

### Step 2

**Determine Metabolic Heat.** Characterize the worker's physical activity (metabolic heat) using Table B2.

**Table B2. Metabolic Heat**

CATEGORIES	EXAMPLE ACTIVITIES	METABOLIC RATE KCAL/HR
Resting	Sitting quietly	100
Light	Sitting with moderate arm movements Sitting with moderate arm and leg movements Standing with light work at machine or bench while using mostly arms Using a table saw Standing with light or moderate work at machine or bench and some walking about	113-140 140-160 140-160
Moderate	Scrubbing in a standing position Walking about with moderate lifting or pushing Walking on level at 3.5 mph while carrying 3 kg weight load	165-190 250-350
Heavy	Carpenter sawing by hand Shoveling dry sand Heavy assembly work on a noncontiguous basis Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)	380-500
Very Heavy	Shoveling wet sand	500-600

### Step 3

*Determine Worker Acclimatization.* Acclimatization refers to the physiological adjustment to heat stress conditions. Full heat acclimatization requires up to three weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work to be conducted. Loss of acclimatization may begin within four days after discontinuing work. A worker may be considered acclimatized when there has been a recent history of heat-stress exposure, such as five of the last seven days.

### Step 4

*Determine Whether Screening Criteria Have Been Exceeded.* Use Table B3, WBGT Index Screening Criteria and the information gathered in Steps 1-3 to determine if screening criteria have been exceeded. If work conditions exceed the criteria shown in Table B3, medical surveillance will be initiated.

**Table B3. WBGT Index (°F) Screening Criteria for Heat Stress Exposure**

	ACCLIMATIZED				UNACCLIMATIZED			
WORK DEMANDS	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
100% Work	85.1	81.5	78.8	Conduct physiological monitoring	81.5	77	72.5	Conduct physiological monitoring
75% Work 25% Rest	86.9	83.3	81.5	Conduct physiological monitoring	84.2	79.9	76.1	Conduct physiological monitoring
50% Work 50% Rest	88.7	85.1	83.3	81.5	86	82.4	79.9	77
25% Work 75% Rest	90.5	87.8	86	85.1	87.8	84.2	82.4	79.5

Regardless of whether the screening criteria have been exceeded, symptoms of heat strain (heat related illness), such as fatigue, nausea, dizziness and lightheadedness, must not be ignored. The presence of these symptoms indicates the need for medical evaluation as well as the need to re-evaluate heat stress.

These screening criteria must not be used when workers are wearing clothing that is highly restrictive or impermeable to heat or vapor (i.e., multiple-layered clothing or encapsulating suits).

## **Appendix C. Medical (Physiological) Surveillance**

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Workers required to work in hot environments that exceed the WBGT Screening Criteria<sup>2</sup> must be medically evaluated to determine whether they can do so without excessive heat strain. The Park shall institute a medical surveillance program for all workers who exceed the heat stress screening criteria in Table B3. Medical examination and procedures will be performed by or under the direction of a licensed physician or health care provider.

By monitoring one or more physiological parameters, we can determine excessive heat strain. Excessive heat strain is indicated when any of the following occur:

- Sustained heart rate is in excess of 180 beats per minute less the worker's age in years for individuals with assessed normal cardiac performance.
- Core body temperature is greater than 101.3°F in healthy, unmedicated and acclimatized workers.
- Core body temperature is greater than 100.4°F for unselected, unacclimatized workers.
- Recovery heart rate at one minute after a peak work effort is greater than 110 beats per minute.
- There are symptoms of sudden and severe fatigue, nausea, dizziness or light-headedness.

Worker exposure must be discontinued when any of these conditions occur.

An individual may be at greater risk if there has been sustained profuse sweating over a period of hours, when weight loss over the work shift is greater than 1.5% of body weight, and when 24-hour urinary sodium excretion is less than 50 mmoles.

Consideration must always be given to variable tolerance of workers to heat stress. If a worker appears to be disoriented or confused, or suffers inexplicable irritability, malaise, or flu-like symptoms, the worker should be removed for rest in a cool location with rapidly circulating air and kept under skilled observation. Immediate emergency care may be necessary. If sweating stops and the skin becomes hot and dry, immediate emergency care with hospitalization is essential.

2 In the absence of detailed heat stress evaluations conducted by an industrial hygienist.

## **Appendix D: Controlling Heat Strain**

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### **General Heat Stress Controls**

General controls must be implemented when heat stress is elevated and the risk of excessive heat strain exists. Elevated heat stress conditions occur when the HI is 105°F or greater and when the WBGT Heat Stress Screening Criteria are exceeded. Also note that elevated heat stress conditions may also exist for certain individuals and circumstances.

- Provide accurate verbal and written instructions, frequent training programs and other information about heat stress and strain.
- Encourage drinking small volumes (approximately 1 cup) of cool, palatable water about every 20 minutes.
- Permit self-limitation of exposures and encourage co-worker observation to detect signs and symptoms of heat strain in others.
- Counsel and monitor those who take medication that may compromise normal cardiovascular, blood pressure, body temperature regulation, renal or sweat gland functions, and those who abuse or are recovering from the abuse of alcohol or other intoxicants.
- Encourage healthy lifestyles, ideal body weight and electrolyte balance.
- Adjust expectations of those returning to work after absence from hot exposure situations and encourage consumption of salty foods (with the approval of a physician if on a salt-restricted diet).
- Consider pre-placement medical screening to identify those susceptible to systematic heat injury.
- Task-specific controls must be implemented for workers at high risk of increased heat stress due to their work environment or required protective equipment. Examples are firefighters and emergency responders to hazardous materials incidents.
- Consider engineering controls that reduce the metabolic rate, provide general air movement, reduce process heat and water vapor release, and shield radiant heat sources, among others.

### **Task-Specific Controls**

- Consider administrative controls that set acceptable exposure times, allow sufficient recovery and limit physiological strain.
- Consider personal protection that is demonstrated effective for the specific work practices and conditions at the location.

**Table D1. Checklist for Controlling Heat Stress**

10	Control metabolic heat (reduce body heat production)	<ul style="list-style-type: none"> <li>• Reduce physical demands of the work.</li> <li>• Provide powered assistance for heavy tasks.</li> </ul>
10	Reduce radiant heat load	<ul style="list-style-type: none"> <li>• Interpose a line-of-sight barrier.</li> <li>• Furnace wall insulation, metallic reflecting screen, heat reflective clothing.</li> <li>• Cover exposed part of the body.</li> </ul>
10	Reduce convective heat load	<ul style="list-style-type: none"> <li>• If air temperature is above 95°F, reduce air temperature, reduce air speed across skin, and wear clothing.</li> <li>• If air temperature is less than 95°F, increase air speed across skin and reduce clothing.</li> </ul>
10	Maximize evaporative cooling by sweating	<ul style="list-style-type: none"> <li>• Decrease humidity, increase air speed, and decrease clothing.</li> </ul>
10	Modify work practices	<ul style="list-style-type: none"> <li>• Shorten duration of each exposure. More frequent short exposures are better than fewer long exposures.</li> <li>• Schedule very hot jobs in cooler part of the day when possible.</li> </ul>
10	Exposure limit	<ul style="list-style-type: none"> <li>• Allow self-limiting of exposure based on formal indoctrination of workers and supervisors on signs and symptoms of excessive strain.</li> </ul>
10	Recovery	<ul style="list-style-type: none"> <li>• Provide air-conditioned space nearby.</li> </ul>
10	Personal protection	<ul style="list-style-type: none"> <li>• Provide cooled air, cooled fluid or ice-cooled conditioned clothing.</li> <li>• Provide reflective clothing or aprons.</li> </ul>
10	Other	<ul style="list-style-type: none"> <li>• Determine by medical evaluation, primarily of cardiovascular status.</li> <li>• Careful break-in of unacclimatized workers.</li> <li>• Water intake at frequent intervals to prevent hypohydration.</li> <li>• Fatigue or mild illness such as low-grade infection, diarrhea, sleepless night or alcohol ingestion not related to the job may temporarily contraindicate exposure.</li> </ul>
10	Heat wave	<ul style="list-style-type: none"> <li>• Introduce a heat alert program.</li> </ul>

**Never Ignore Anyone's Signs or Symptoms of Heat-Related Disorders**

## **Appendix E: Signs and Symptoms of Heat Strain and First Aid Procedures**

Prevention of serious heat-induced illness depends on the early recognition of signs and symptoms and prompt implementation of control measures. Therefore, employees must receive training in the following topics:

- Recognition of the signs and symptoms of heat strain (see Table E1).
- Personal care procedures that employees should use to reduce the risk of illness.
- The influence of non-occupational factors such as alcohol use, medication, obesity and other health factors on employees' tolerance to occupational heat stress.
- Workers who use heat-protective clothing and equipment must be instructed in their proper care and use.

Table E1.1. Recognition, Medical Aspects and Prevention of Heat Illness

ILLNESS	RECOGNITION, CLINICAL FEATURES	PREDISPOSING FACTORS	PHYSIOLOGICAL BASIS	FIRST AID AND TREATMENT	PREVENTION
Heat stroke	Hot dry skin usually red, mottled or cyanotic; rectal temperature 104°F or greater; confusion, loss of consciousness, convulsions, rectal temp. continues to rise, fatal if treatment delayed	Sustained exertion in heat by unacclimatized workers Lack of physical fitness and obesity Recent alcohol intake; dehydration; individual susceptibility; chronic cardiovascular disease	Partial or complete failure of sweat mechanism leading to loss of evaporative cooling and uncontrolled rise in body temperature	Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air, avoid over-cooling, treat shock if present	Medical screening of workers, selection of workers for tasks based on health and physical fitness, acclimatization, monitoring of workers during sustained work in severe heat
Heat syncope	Fainting while standing erect and immobile in heat	Lack of acclimatization	Pooling of blood in dilated vessels of skin and lower parts of body	Remove to cooler area, rest in recumbent position, recovery prompt and complete	Acclimatization, intermittent activity to assist venous return to heart
Heat exhaustion	Fatigue, nausea, headachy, giddiness; skin clammy and moist, complexion pale, muddy, or hectic flush; may faint on standing with rapid thready pulse and low blood pressure; Oral temperature normal or low but rectal temperature, usually elevated; water restriction types: urine volume small, highly concentrated; salt restriction type: urine less-concentrated	Sustained exertion in heat; lack of acclimatization; and failure to replace water lost in sweat	Dehydration form deficiency of water; depletion of circulating blood volume; circulatory strain from competing demands for blood flow to skin and to active muscles	Remove to cooler environment, rest in recumbent position, administer fluids by mouth, keep at rest until urine volume indicates that water balances have been restored	Acclimatize worker using a break-in schedule for 5-7 days, supplement dietary salt only during acclimatization, ample drinking water to be available at all times and to be taken frequently during workday

Table E1.2. Recognition, Medical Aspects and Prevention of Heat Illness

ILLNESS	RECOGNITION, CLINICAL FEATURES	PREDISPOSING FACTORS	PHYSIOLOGICAL BASIS	FIRST AID AND TREATMENT	PREVENTION
Heat cramps	Painful spasms of muscles used during work (arms, legs, or abdominal); onset during or after work hours	Heavy sweating during hot work; drinking large volumes of water without replacing salt loss	Loss of body salt in sweat, water intake dilutes electrolytes, water enters muscles, causing spasm	Salted liquids by mouth or more prompt relief by IV infusions	Adequate salt intake with meals; in unacclimatized worker supplement salt intake at meals
Heat rash	Profuse tiny raised red vesicles (blister-like) on affected areas, pricking sensations during heat exposure	Unrelieved exposure to humid heat with skin continuously wet with unevaporated sweat	Plugging of sweat gland ducts with retention of sweat and inflammatory reaction	Mild drying lotions, skin cleanliness to prevent infection	Cool sleeping quarters to allow skin to dry between heat exposures
Anhidrotic heat exhaustion	Extensive areas of skin which do not sweat on heat exposure, but present gooseflesh appearance, which subsides with cool environments; associated with incapacitation in heat	Weeks or months of constant exposure to climatic heat with previous history of extensive heat rash and sunburn	Skin trauma (heat rash; sunburn) causes sweat retention deep in skin, reduced evaporative cooling causes heat intolerance	No effective treatment available for anhidrotic areas of skin, recovery of sweating occurs gradually on return to cooler climate	Treat heat rash and avoid further skin trauma by sunburn, periodic relief from sustained heat
Heat fatigue—transient	Impaired performance of skilled sensorimotor, mental, or vigilance tasks, in heat	Performance decrement greater in unacclimatized and unskilled workers	Discomfort and physiologic strain	Not indicated unless accompanied by other heat illness	Acclimatization and training for work in the heat
Heat fatigue—chronic	Reduced performance capacity, lowering of self-imposed standards of social behavior (e.g., alcoholic over-indulgence). Inability to concentrate	Workers at risk come from temperate climates, for long residence in tropical latitudes	Psychosocial stresses probably as important as heat stress, may involve hormonal imbalance but not positive evidence	Medical treatment for serious cases, speedy relief of symptoms on returning home	Orientation to life in hot regions (customs, climate, living conditions, etc.)

#### **4.14 COLD INJURY PREVENTION**

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RESERVED

## 4.15 SAFE WORK PRACTICES FOR EMPLOYEES HANDLING WILDLIFE

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### Purpose

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The purpose of this document is to provide guidance that will assist National Park Service (NPS) staff in identifying and mitigating risks associated with handling wildlife so that important natural resource management and visitor protection activities can be performed in a safe manner.

***Even if only brief and incidental to primary duties, any park unit employee may come into contact with live or dead animals. All employees are encouraged to review this document and consider when and how to protect themselves from the potential hazards of handling wildlife.***

### Background

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NPS staff handle a wide range of wildlife species under a variety of circumstances in efforts to manage park resources, maintain park facilities, provide for visitor experiences, and protect human health and safety. Wildlife biologists may be the most recognized animal-handlers due to their work in wildlife capture, tagging, sampling, monitoring, translocation, and research. In addition to handling live animals, biologists also may handle dead animals for diagnostic submission, [necropsy](#), or disposal. These investigations on both live and dead wildlife are critical because they contribute to a better understanding of park resources and help managers make informed decisions.

While biologists may handle wildlife most frequently, they are not the only employees who come into contact with wildlife. Maintenance workers and others deal with wildlife as well, often for removal from structures or for disposal. In fact, the mission of the NPS to conserve natural resources while providing for their enjoyment inherently brings wildlife and people, both staff and visitors, into closer proximity in parks than most other areas. These management activities and human-wildlife interactions often are vital to meeting park objectives and fulfilling NPS mandates; however, they are not without some risk.

Although an inherent risk to human health and safety exists with each wildlife encounter, this risk should be viewed in perspective with other hazards and a comprehensive approach to occupational safety used to reduce a variety of risks. This prudent approach to minimizing risks of injury or illness includes an understanding of basic safety measures and disease transmission, common sense, and awareness of surroundings. Basic safety measures may mean implementing the use of proper protective equipment for a particular job, or traveling in pairs and informing a supervisor of activities, especially if traveling alone. An understanding of potential [zoonotic](#) diseases – those diseases that can be transferred between humans and animals – not only can help prevent illness, but also aid in the identification of symptoms that can lead to timely medical attention.

Equally important to implementing basic safety measures and becoming informed on potential zoonotic disease risks, is having an awareness of the general environment. Planning for expected terrain, weather, or wildlife interactions, informs decisions on what personal protective equipment (PPE) to bring to the field. Although it is unreasonable to contain all risks or control the natural environment, deliberate **P**lanning, **P**reparation, and **E**xecution of safety measures, as appropriate for the situation, can reduce the chances of illness or injury.

## **Objectives**

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To assist NPS staff in preparing [Job Hazard Analyses](#) (JHA) for handling wildlife by:

- Identifying types of risks that may be encountered when handling wildlife, *and*
- Introducing appropriate levels of precautions based on specific activities.

A thorough understanding of potential hazards associated with different activities performed by employees working with wildlife is essential in providing a safe work environment. When conducting wildlife studies, analyzing and mitigating risks are integral parts of every job.

A JHA is a multi-step process designed to study and analyze a job in a particular working environment. It breaks a task down into steps, identifies potential risks associated with each component, and may reveal ways of reducing or eliminating these hazards. JHAs result in a detailed written procedure for safely completing a particular job. ([See Reference Manual 50B Section 3.1 Job Hazard Analysis](#))

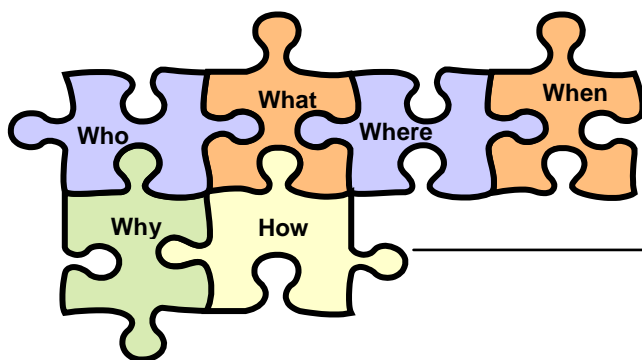
***The key to a successful Job Hazard Analysis is avoiding a “one size fits all” approach. The process is meant to stimulate constructive conversation between supervisors, employees, and others involved in the task. The outcome is a written document outlining the steps of the job, the potential hazards, and proposed actions to avoid or mitigate these hazards.***

## Visual Guide for Safe Work Practices

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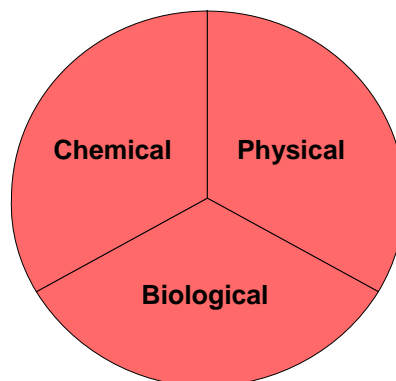
### Plan

(Define the task and the context in which it will occur)



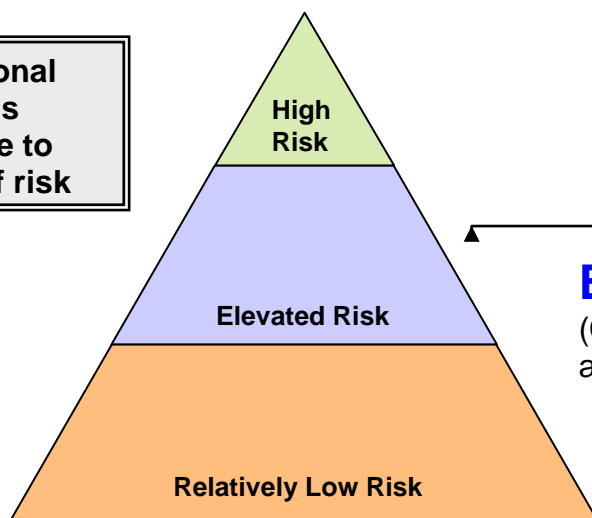
### Prepare

(Understand the hazards; this may require outside assistance)



Use additional  
precautions  
appropriate to  
the level of risk

Use  
Standard  
Precautions



### Execute

(Carry out the protective actions appropriate to the level of risk)

## Plan

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A number of physical, chemical, and biological risks are present in everyday field work, but these threats can be increased when focus is being placed on handling wildlife. Handling wildlife is inherently risky to human health and safety in part due to the level of uncertainty and unpredictability associated with the activity. To better understand, prepare for, and moderate these risks, the tasks must be well defined and each component carefully considered. This may be accomplished by describing who, what, where, when, why, and how each part of the job will be completed (see [Table 1](#)). By clearly explaining each of these components, as well as identifying the equipment and personnel needed to complete them, the analysis can uncover potentially hazardous situations and allow for appropriate mitigation.

**Table 1. Defining the task**

Who	<ul style="list-style-type: none"><li>• who assumes responsibility for supervision of the overall project</li><li>• who completes the collection, transport, or shipping of an animal, or of wildlife samples</li></ul>
What	<ul style="list-style-type: none"><li>• what parts of animal collection, sampling, or transport present a hazard</li><li>• what training is necessary</li><li>• what recourses are available for additional information</li></ul>
When	<ul style="list-style-type: none"><li>• when are these actions appropriate (does the benefit outweigh the potential risks)</li><li>• when should specific actions be performed</li></ul>
Where	<ul style="list-style-type: none"><li>• where should these tasks be completed</li><li>• where should animals/samples be transported to</li></ul>
Why	<ul style="list-style-type: none"><li>• why is the task necessary</li><li>• why is the task potentially hazardous</li></ul>
How	<ul style="list-style-type: none"><li>• how should the task be completed (a detailed explanation)</li><li>• how breaches in safe work practices will be handled</li></ul>

## Prepare

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Perhaps the most critical element of the JHA is having an appreciation of potential hazards of working with wildlife. Hazards may be grouped into three general categories: physical, chemical, and biological. Examples of each hazard type may be found in [Table 2](#). While chemical and physical hazards may be relatively easily identified, biological hazards are more likely to be unrecognized or misunderstood. Therefore, this document provides proportionately more information and resources to assist managers in identifying biological hazards, primarily sources of infectious zoonotic disease.

**Table 2. Potential Risks**

<b>Category</b>	<b>Specific Risk</b>
<b>Physical</b>	<ul style="list-style-type: none"> <li>• Environmental <ul style="list-style-type: none"> <li>○ Uneven or Extreme Terrain (e.g., slips, trips, falls, avalanche, wind)</li> <li>○ Elevation (e.g., altitude sickness)</li> <li>○ Climate (e.g., dehydration, drowning)</li> <li>○ Weather (e.g., lightning, exposure to heat, cold, UV radiation)</li> </ul> </li> <li>• Animals <ul style="list-style-type: none"> <li>○ Predators</li> <li>○ Handled animal (e.g., kicks, bites, crushing, strains)</li> <li>○ Associated animal (e.g., attack from another member of the group)</li> </ul> </li> <li>• Equipment <ul style="list-style-type: none"> <li>○ Firearms</li> <li>○ Helicopters</li> <li>○ Biomedical sharps (e.g., needles, scalpels, necropsy knives)</li> <li>○ Vehicles, live-capture traps, transport cages</li> </ul> </li> <li>• Man-Made <ul style="list-style-type: none"> <li>○ Traffic</li> <li>○ Noise</li> <li>○ Electrical</li> </ul> </li> </ul>
<b>Chemical</b>	<ul style="list-style-type: none"> <li>• Task Specific <ul style="list-style-type: none"> <li>○ Pharmaceuticals (e.g., anesthetics, antibiotics)</li> <li>○ Chemicals used for specimen preservation (e.g., formalin)</li> <li>○ Disinfectants (e.g., bactericides, viricides)</li> </ul> </li> <li>• Environmental <ul style="list-style-type: none"> <li>○ Toxins (e.g., pesticides, herbicides)</li> <li>○ Gases (e.g., hydrogen sulfide, sulfur dioxide)</li> <li>○ Chemical spills (e.g., gasoline, oil)</li> </ul> </li> </ul>
<b>Biological</b>	<ul style="list-style-type: none"> <li>• Infectious zoonotic disease</li> <li>• Exposure to venomous animals or allergic reaction to any animal</li> <li>• Poisonous plants</li> </ul>

#### *A. Physical*

Employees working outdoors are exposed to many types of physical hazards depending on the type of work, geographic region, season, and duration of time spent outside. In addition, man-made hazards such as electrical overhangs, utilities, canals, and various types of infrastructure, should be identified and assessed prior to work.

##### *1. Injury (due to animals or equipment)*

Wild animals can inflict injury on humans unintentionally or as an act of aggression or defense. While mammalian predators and venomous reptiles often are thought of as dangerous, most wildlife can injure humans through biting, kicking, scratching, stomping, or crushing. An understanding of animal behavior is essential for safely handling wildlife.

In addition to hazards associated with direct animal handling, much of the equipment, if improperly used, can be dangerous to humans. Traditional firearms, remote delivery systems (i.e., dart guns), traps, and snares can cause trauma to humans. Knives, needles, and other sharps can also cause injury. Use of aircraft for animal capture and monitoring poses an additional risk. Department of the Interior policies on use of firearms by non-law enforcement personnel and ACETA (Aerial Capture, Eradication, and Tagging of Animals) are under development.

## 2. *Injury (due to environment)*

Although the allure of working outdoors attracts many people to the NPS, there are unique hazards employees encounter when working outdoors. The basic hazards that need consideration when working outside are:

- Exposure to:
  - Heat Stress
  - Cold Stress
  - Dehydration
  - UV Radiation (Sun)
  - Lightning
  - Wind (falling trees/limbs)
- Topography
  - Elevation
  - Water hazards

## B. *Chemical*

Chemical hazards can be divided into those associated directly with wildlife capture or handling, and those already part of the environment. Chemicals related to handling wildlife include pharmaceuticals (e.g., anesthetics), reagents used to preserve biological samples (e.g., formalin), and disinfectants (e.g., bleach). Pharmaceuticals used to immobilize wildlife can be dangerous and potentially life-threatening. Exposure to drugs may occur through accidental injection, ingestion, or absorption through mucous membranes or breaks in the skin. See Kreeger et al., 2002, for an overview of human safety associated with chemical immobilization; see [Draft Director's Order #77-4, Use of Pharmaceuticals for Wildlife](#), for NPS requirements on use of wildlife pharmaceuticals. Material safety data sheets (MSDS) for many chemicals used in laboratory analysis of samples can be found at [MSDS Search](#) ([www.msdssearch.com](http://www.msdssearch.com)).

Environmental chemical hazards may be either naturally occurring (e.g., sulfur dioxide), may be intentionally applied (e.g., pesticides, herbicides), or could be accidentally spilled (e.g., gasoline, oil). Exposure to these substances from [dermal](#) contact (either direct or indirect) or inhalation may result when working in contaminated environments. If the substance is known, obtain an MSDS and evaluate the activity to be conducted and determine the likely risk exposure.

### C. *Biological*

There are a variety of biological hazards associated with handling wildlife. Some of the most common are exposure to venomous animals (e.g., snakes) and hypersensitivity type allergic reactions due to contact with any plant or animal a person is responsive to (e.g., bee stings, pollen, poison ivy). While less common and potentially less well understood, transmission of infectious diseases between wildlife and humans also poses an important biological hazard. Diseases that are shared between animals and humans are termed zoonotic diseases. Zoonotic diseases are generally uncommon; however, the consequences of disease may be high. This can lead to an increase in concern and dread about infection. There are a number of established zoonotic diseases of importance (see the ZED website at <http://inside.nps.gov/publichealth/zed/zed.htm>) and new zoonotic diseases continue to emerge (e.g., highly pathogenic avian influenza Asian strain H5N1). Concern at some level is prudent. Further, many zoonotic diseases (e.g., plague, West Nile virus, brucellosis, bovine tuberculosis, and in most areas, rabies) are exotic to park systems and impart negative impacts not just on human health, but also on the health of native wildlife species. Therefore, management of these diseases may be warranted.

Transmission of zoonotic diseases requires three elements: an infection source, a susceptible host, and a route of transmission for the [pathogen](#) (Siegel et al., 2007). Potential zoonotic infection sources include animals, carcasses, body fluids (e.g., blood, urine, and saliva), feces, aborted fetuses, and environments (e.g., water, soil, burrows) contaminated by infected animals. Besides humans, susceptible hosts can include other species or animals of the same species. Transmission routes for zoonotic diseases are varied and depend on many factors, including the biological properties of the pathogen and the way in which the pathogen leaves the infected host.

There are three main routes of transmission for zoonotic pathogens: contact, through the air, and via [vectors](#) (see [Table 3](#)). It is possible for the same pathogen to be transmitted by multiple routes. Contact transmission occurs when pathogens enter the human host by ingestion, mucous membrane contamination, or through breaks in the skin. Direct contact transmission occurs when the pathogen is transferred after handling infected animal or biological samples from an infected animal. Indirect contact transmission may occur by handling contaminated objects, touching contaminated surfaces, or from the environment. Transmission via air occurs when pathogens from animals or their environments travel through the air and are inhaled or deposited on mucous membranes. Pathogens may become [aerosolized](#) when an infected animal coughs or sneezes, when contaminated dust particles are disturbed, or through aggressive handling of infected animal tissues. Some pathogens (e.g., plague) may be transmitted by respiratory droplets or splashing of contaminated fluids. These pathogens travel only short distances through the air in droplet form and require close proximity (<2 meters) to the infected animal or environment. Other pathogens (e.g., hantaviruses) may be transmitted as ultra-small particles and can travel longer distances by air currents. Vector-borne transmission occurs when a biting [arthropod](#) (e.g., mosquitoes, ticks, fleas) transfers the pathogen from an infected animal to a human host. Vectors may be encountered when handling wild animals and when working in field settings.

**Table 3. Disease Transmission Routes**

<b>Transmission Route</b>	<b>Entry Into Body</b>	<b>Risk Activity Examples</b>	<b>Disease Examples</b>
<b>Contact-Direct</b>	Ingestion, mucous membrane contamination, breaks in the skin	Trapping, handling, sampling live or dead animals; handling animal samples (e.g., blood)	Rabies, <i>Salmonella</i> , plague, tularemia, brucellosis, anthrax, scabies
<b>Contact-Indirect</b>	Ingestion, mucous membrane contamination, breaks in the skin	Handling contaminated equipment such as traps, lab or field equipment, needles, pencils, soiled laundry, vehicle interiors, countertops	Same as above
<b>Aerosol</b>	Inhaled small particles or droplets deposited on mucous membranes	Disturbing contaminated dust particles (e.g., cleaning buildings), close contact with animals	Small particulate: hantaviruses, highly pathogenic avian influenza Droplet: Plague
<b>Vector-borne</b>	Bite of infected invertebrate animal (e.g., tick, flea, mosquito)	Working in environment with vectors; handling carcasses infested with vectors	Lyme disease, plague, tularemia, Rocky Mountain spotted fever, relapsing fever, West Nile virus

### **Execute (applying strategies for mitigation)**

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Once potential chemical, physical, and biological hazards are identified, mitigation strategies may be implemented. Excellent communication between supervisors, employees, and others participating in the task, is the first step in mitigating a hazard. Each party plays a role in taking responsibility for creating and maintaining a safe working environment. Part of this communication requires a working knowledge of potential hazards, familiarity with appropriate working conditions, and recognition of the need for additional training. Management support for training, clear description of the scope of work, development of standard operating procedures (SOPs), and on-the-job monitoring are necessary to reap the benefits of JHAs. It is important to remember that familiarity with an activity or expertise in a subject area can lead to complacency by employees and supervisors. The key is to always think through the task, identify the potential hazards, and provide for reasonable safety precautions, no matter how often a job has been performed. For resources related to mitigating general hazards, see [Table 4](#).

The types of approaches used to prevent human injury or illness during wildlife capture and/or handling vary with factors such as the species, sex, age of the animal, behavior of animal (wild, habituated, food-conditioned), reason for animal handling, level of employee experience, and presence of [enzootic](#) zoonotic disease(s). In general, handling devices (e.g., squeeze chambers in traps and other restraint mechanisms) and/or animal anesthesia can decrease the risk of physical injury from animals that are not easily restrained; however, training and familiarity are required for the safe use of these tools. These techniques may not be appropriate under all conditions or may not be sufficient for hazard reduction if used alone. Reducing biological risks generally requires an

appropriate barrier between the animal, or animal samples, and the handler (e.g., gloves, coveralls, or eye/respiratory protection). Additional methods for hazard reduction may include the following:

- Development and review of protocols or SOPs on animal handling
- Daily or periodic project safety briefings and post-handling debriefing
- Training on appropriate techniques for chemical or physical restraint
- Awareness of intentional or accidental trauma from animals
- Awareness of potential zoonotic diseases in the area or handled species
- Vaccination against potential pathogens as appropriate to the level of risk (e.g., [rabies](#), tetanus)
- Training on when and how to use PPE
- Contingency plans (e.g., escape route, contact information for medical advice)

While human safety is the primary goal, these techniques should not be used in a manner that puts animals at undue risk of injury, excessive stress, or capture-related death.

Training employees in the essential components outlined in this document is critical to protecting workers from injuries and illnesses when conducting wildlife management or research, nuisance animal removal, and pest control. Training is an important part of the NPS safety and health program. If employees are unfamiliar with specific job hazards and proper work practices, this may be a cause for higher injury rate, and training may provide a solution. The NPS regularly produces a variety of training courses that can be useful in providing information for working safely. Information may be found on the DOI Learn website at <https://doilearn.doi.gov>, and the [ZED](#) website.

SOPs are appropriate for jobs where the same basic actions will be repeated regularly, and are particularly helpful when consistency is needed to ensure suitable outcomes. They need not be onerously detailed or prohibit deviations for unique circumstances in the field. SOPs are often indirectly incorporated into wildlife capture or management plans. For example, an SOP for necropsy procedures may be particularly helpful to direct use of PPE, ensure consistent sampling, explain correct shipping, provide for adequate sanitation, and describe situations that may indicate high risk wildlife mortality events. For sample submission instructions, see the [NPS Wildlife Health](#) website.

#### A. *Mitigating General Hazards*

There are general safe work practices that provide protection against a variety of the most common hazards (see [Table 4](#)).

**Table 4. General Hazard Mitigation**

Hazard	Exposure	PPE and Safe Work Practices
<b>Physical</b>	Contact	<ul style="list-style-type: none"> <li>• <a href="#">NOAA's National Weather Service Heat Index</a></li> <li>• <a href="#">Heat Stress Facts</a></li> <li>• <a href="#">Protect Yourself from the Sun</a></li> <li>• <a href="#">Cold Stress Facts</a></li> <li>• <a href="#">Cold Card</a></li> <li>• <a href="#">Hazard from Mudslides</a></li> <li>• <a href="#">Landslides</a></li> <li>• <a href="#">Flashflood Warning System</a></li> <li>• <a href="#">NIOSH Slips, Trips, Falls</a></li> <li>• <a href="#">Work Zone Traffic Safety</a></li> <li>• <a href="#">RM 50 B Section 4.2</a></li> <li>• <a href="#">Hearing Loss Prevention</a></li> <li>• <a href="#">Lightning</a></li> <li>• <a href="#">Proper Biomedical Sharps Disposal</a></li> </ul>
<b>Chemical</b>	<ul style="list-style-type: none"> <li>• Inhalation</li> <li>• Ingestion</li> <li>• Dermal absorption</li> <li>• Injection</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">RM 50 B Section 4.4 Hazard Communications</a></li> <li>• <a href="#">OSHA Hazardous Communication Standard</a></li> <li>• <a href="#">MSDS Search</a></li> <li>• <a href="#">NIOSH Pocket Guide to Chemicals</a></li> <li>• <a href="#">NIOSH Respirator Topic Page</a></li> <li>• <a href="#">Formalin MSDS</a></li> </ul>
<b>Biological</b>	No high risk exposure anticipated	<p>Standard Precautions:</p> <ul style="list-style-type: none"> <li>• Hand Hygiene – <b>Hand washing with soap and water is the single most important measure for reducing the risk of disease transmission.</b> Alcohol-based sanitizers can be used as an adjuvant to hand washing (particularly when running water is not available), but is not a substitute for hand washing.</li> <li>• Promptly disinfect soiled equipment, environmental surfaces, and other contaminated items using an appropriate disinfection agent; dispose of <a href="#">biological waste</a> properly.</li> <li>• Do not eat, drink, or smoke when handling animals.</li> <li>• When working with wildlife indoors, be sure to work in a well-ventilated area.</li> <li>• Avoid needle sticks or cuts during handling; report injuries.</li> <li>• Take care to avoid and/or use physical barriers for protection from wildlife defense mechanisms (e.g., bites, scratches, stings).</li> <li>• Transport, <a href="#">ship</a>, and store samples according to applicable regulations (do not store samples with food).</li> <li>• Discuss need for prophylactic vaccination (e.g., <a href="#">rabies</a>, tetanus) with physician.</li> <li>• Carry appropriate medications/tools to treat allergic hypersensitivities and mitigate venomous bites (e.g., epinephrine auto-injector, snake bite kit).</li> <li>• Seek medical attention if concerned about an exposure to a zoonotic disease or if ill, inform physician of potential exposures.</li> </ul>
	Contact	<p>Add to Standard Precautions:</p> <ul style="list-style-type: none"> <li>• Disposable gloves should be readily available and worn when touching blood, body fluids, secretions, excretions, mucous membranes, and non-intact or diseased skin.</li> <li>• Coveralls, lab coat, or <a href="#">dedicated clothing</a>.</li> <li>• <a href="#">Goggles</a> if splash risk exists.</li> <li>• Impermeable gloves (e.g., leather) if handling animals that may bite or scratch.</li> </ul>

**Table 4. General Hazard Mitigation**

Hazard	Exposure	PPE and Safe Work Practices
	Aerosol	Add to Standard and Contact Precautions: <ul style="list-style-type: none"> <li>• <a href="#">Mask</a> (droplet hazards) or <a href="#">respirator</a> (inhaled particulate hazards). Use of respirator requires specific program elements (<a href="#">See Reference Manual 50 B Section 4.3 Respiratory Protection</a>)</li> <li>• Eye protection: <a href="#">Goggles</a> appropriate to the disease risk.</li> </ul>
	Vector	Add to Standard Precautions: <ul style="list-style-type: none"> <li>• Insect repellents on body and clothing.</li> <li>• Wear light colored long-sleeved clothing and long pants.</li> <li>• Wear coveralls or dedicated clothing if ticks or fleas are a concern.</li> <li>• Minimize activities at dawn and dusk if mosquitoes are a concern.</li> <li>• Tick checks.</li> <li>• Bag animal carcass with insecticide if arthropods observed.</li> </ul>

#### *B. Mitigating Specific Zoonotic Disease Risks*

Standard Precautions (see [Table 4](#)) are infection control measures that should be applied at all times by all persons when working with or exposed to wildlife. Standard precautions alone are likely adequate protective measures for low-risk situations, such as working with apparently healthy animals in areas without enzootic disease.

Beyond these Standard Precautions, certain situations may present additional risks for zoonotic disease transmission that require other protective work measures and practices. The first step in mitigating disease hazards is to identify if a zoonotic pathogen may exist in the species of wildlife being handled and in the region of the country where the work is being done. Additionally, it is important to assess the relative likelihood of pathogen presence. An abbreviated list of zoonotic disease pathogens is available on the [ZED](#) website. This website also contains links and reprints of publications on specific safe work practices for some of the most serious zoonotic diseases. Several zoonotic disease handbooks also are available (e.g., Heymann 2004). Additionally, consultation with a wildlife disease professional is warranted and encouraged if there are questions or uncertainty about zoonotic disease risk in a given area or species. Once a disease risk has been recognized, a transmission route(s) can be determined and appropriate safe work practices and PPE selected for the job. See [Table 5](#) for recommendations on appropriate PPE for specific tasks and conditions.

***The keys to preventing exposure to zoonotic diseases are:***

- 1. Use available resources to identify potential zoonotic pathogens.***
- 2. Determine potential route(s) of transmission (contact, aerosol, vector-borne).***
- 3. Determine appropriate safe work practices and PPE to prevent exposure.***
- 4. Implement these measures when working in potential exposure situations.***

**Table 5. Specific Activities with Exposure to Zoonotic Disease Pathogens and Protective Practices**

<b>Activity</b>	<b>Conditions</b>	<b>Activity Risk</b>	<b>PPE</b>	<b>Work Practice</b>
1. Handling apparently healthy live animals.	No substantial local zoonotic disease concerns or vectors.	Zoonotic disease risk from casual contact is minimal.	<ul style="list-style-type: none"> <li>Clothing appropriate to the nature of the operation</li> </ul> <i>Except:</i> <ul style="list-style-type: none"> <li>Disposable gloves and eye protection when handling healthy birds<sup>1</sup></li> </ul>	1. Use Standard Precautions.
2. Handling biological samples from apparently healthy live animals.	No substantial local zoonotic disease concerns or vectors.	Zoonotic disease risk may increase with contact of body fluids or biological samples from animals.	<ul style="list-style-type: none"> <li>Disposable gloves</li> <li>Coveralls, lab coat, or dedicated clothing</li> </ul>	1. Use Standard and Contact Precautions.
3. Handling apparently healthy live animals (or samples) from areas with known zoonotic disease risks.	Disease exists (or spills into) handled species or vectors associated with handled species.	Risk increases if a zoonotic disease is known to be present in the area, a species, or vector (e.g., plague, rabies, brucellosis).	<ul style="list-style-type: none"> <li>Disposable gloves</li> <li>Coveralls, lab coat, or dedicated clothing</li> <li>Eye and respiratory protection as appropriate to the level of disease risk</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions plus appropriate precautions for transmission routes of diseases of concern.</li> <li>2. Become familiar with symptoms of the disease in humans and seek medical attention if symptoms occur (inform health care provider of occupation and potential exposure).</li> </ol>
4. Handling sick or injured live animals.	For euthanasia, sampling, or transportation.	Risk increases because cause of illness may be zoonotic and sources of contaminations may increase (e.g., diarrhea)	<ul style="list-style-type: none"> <li>Disposable gloves</li> <li>Coveralls, lab coat, or dedicated clothing</li> <li>Eye and respiratory protection as appropriate to the level of disease risk</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions plus appropriate precautions for transmission routes of diseases of concern.</li> <li>2. Submit diagnostic samples (if ill).</li> <li>3. Prevent visitors or others from contacting a sick or injured animal.</li> </ol>
5. Handling for disposal or submission of animal found dead.	Single dead animal in area with no substantial local zoonotic disease or vectors.	<p>Small animal: Risk is minimal if barrier is used.</p> <p>Large animal: Risk is limited but may increase with size of animal being handled due to potential for contamination</p>	<p>Small animal:</p> <ul style="list-style-type: none"> <li>Disposable gloves or inverted bag for collection</li> </ul> <p>Large animal:</p> <ul style="list-style-type: none"> <li>Disposable gloves</li> <li>Coveralls, lab coat, or dedicated clothing</li> <li>Eye and respiratory protection as appropriate to the level of disease risk</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions plus appropriate precautions for transmission routes of diseases of concern.</li> <li>2. Transport outside passenger area of vehicle (i.e., bed of truck or trunk).</li> <li>3. Bag carcass tightly if it must be placed in passenger compartment or to avoid leakage of blood or other body fluids into the environment.</li> <li>4. Cover all carcasses.</li> </ol>
6. Handling for disposal or submission of	Multiple dead animals in any event or single	Risk may differ if the mortality event is	<p>Small animal:</p> <ul style="list-style-type: none"> <li>Disposable gloves or inverted bag for</li> </ul>	<p>Follow work practices described in #5 above.</p> <p><i>In addition:</i></p>

<sup>1</sup> DOI memorandum on: [Employee Health and Safety Guidance for Avian Influenza Surveillance And Control Activities in Wild Bird Populations](#)

**Table 5. Specific Activities with Exposure to Zoonotic Disease Pathogens and Protective Practices**

<b>Activity</b>	<b>Conditions</b>	<b>Activity Risk</b>	<b>PPE</b>	<b>Work Practice</b>
multiple animals found dead.	dead animal in an area of substantial zoonotic disease or vector risk.	recurring (e.g., juvenile birds washed ashore) vs. unexpected.	collection Large animal: <ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> <li>• Eye and respiratory protection as appropriate to the level of disease risk</li> </ul>	<ol style="list-style-type: none"> <li>1. Inform wildlife biologist of finding and consult with wildlife disease professional for potential causes of illness.</li> <li>2. In an unexpected mortality event: Submit 1-5 animals for diagnostic evaluation and dispose of remaining carcasses in landfill or other approved means.</li> <li>3. Store samples in approved locations according to protocols.</li> <li>4. Become familiar with symptoms of diseases of concern in humans and seek medical attention if symptoms occur (inform health care provider of occupation and potential exposure).</li> </ol>
7. Handling dead animal for necropsy, dissection, or food processing.	Healthy appearing animal that is collected for management or research or animal found dead with no known zoonotic disease risk.	Risk is increased due to closer contact with a variety of body fluids and tissues, but no reason to suspect presence of pathogens or vectors.	<ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions.</li> <li>2. If an animal has received any drugs (anesthetics, euthanasia agent), it is unfit for human consumption and must be removed from the human food chain.</li> </ol>
8. Handling dead animal for necropsy or dissection.	Animal found dead, animal that has been observed ill, or species with known zoonotic risk (e.g., bat, ground squirrel).	Risk is increased due to closer contact with a variety of body fluids and tissues and unknown cause of death.	<ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> <li>• Eye and respiratory protection as appropriate to the level of disease risk</li> <li>• Shoe covers or boots which can be disinfected</li> </ul>	<ol style="list-style-type: none"> <li>1. Consult with public health prior to use of carcass or carcass parts for display or educational purposes.</li> <li>2. Become familiar with symptoms of the disease in humans and seek medical attention if symptoms occur (inform health care provider of occupation and potential exposure).</li> <li>3. Become familiar with warning signs for unusual mortality events: <ul style="list-style-type: none"> <li>- Multiple dead animals</li> <li>- Blood coming from body orifices (nose, rectum) without obvious signs of trauma</li> <li>- Animals displaying neurologic signs prior to death.</li> </ul> </li> </ol>
9. Collection of biological samples from the environment for management or research.	Collection of samples (feces, urine, fetuses) from the environment where no known zoonotic enzootic disease occurs.	Risk from contact with body fluids and tissues, but no known disease is present.	<ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions. <i>In addition:</i></li> <li>2. Store samples in approved and dedicated specimen storage location according to protocols.</li> </ol>

**Table 5. Specific Activities with Exposure to Zoonotic Disease Pathogens and Protective Practices**

<b>Activity</b>	<b>Conditions</b>	<b>Activity Risk</b>	<b>PPE</b>	<b>Work Practice</b>
10. Collection of biological samples from the environment for management or research.	Collection of samples (feces, urine, fetuses) from the environment where zoonotic disease or vectors occur.	Risk from contact with body fluids and tissues from potentially infected animals or their parasites.	<ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> <li>• Eye and respiratory protection as appropriate to the level of disease risk</li> <li>• Shoe covers or boots which can be disinfected</li> </ul>	<ol style="list-style-type: none"> <li>1. Use Standard and Contact Precautions plus appropriate precautions for transmission routes of diseases of concern.</li> </ol> <p><i>In addition:</i></p> <ol style="list-style-type: none"> <li>2. Consult a wildlife health professional for potential causes of illness.</li> <li>3. Become familiar with symptoms of the disease in humans and seek medical attention if symptoms occur (inform health care provider of occupation and potential exposure).</li> <li>4. Consult with public health prior to use of samples for display or educational purposes.</li> </ol>
11. Cleaning areas of animal excreta and handling rodents in traps.	Indoor or field locations with significant accumulation of organic matter.	Mouse excreta or large quantities of bird or bat guano are of considerable concern, particularly in indoor facilities.	<ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Disposable coveralls</li> <li>• Eye and respiratory protection as appropriate to the level of disease risk</li> <li>• Shoe covers or boots which can be disinfected</li> </ul>	See: NPS worker protection recommendations for <a href="#">hantaviruses</a> .
12. Incidental exposure as a result of other duties.	Indoor or outdoor.	Briefly handling or contact with live or dead animals incidental to any work assignments.	<p>Small animal:</p> <ul style="list-style-type: none"> <li>• Disposable gloves or inverted bag for collection</li> </ul> <p>Large animal:</p> <ul style="list-style-type: none"> <li>• Disposable gloves</li> <li>• Coveralls, lab coat, or dedicated clothing</li> </ul>	<ol style="list-style-type: none"> <li>1. Communicate with Natural Resources, Risk Management, or Public Health staff as appropriate.</li> <li>2. Transport outside passenger area of vehicle (i.e., bed of truck or trunk).</li> <li>3. Bag carcass tightly if it must be placed in passenger compartment or to avoid leakage of blood or other body fluids into the environment.</li> <li>4. Cover all carcasses.</li> </ol>

## References

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1. 29 CFR 1910.132 Personal Protective Equipment General Requirements
2. 29 CFR 1910.134 Respiratory Protection
3. Centers for Disease Control and Prevention. What Does Rabies Pre-exposure Prophylaxis Involve?, Retrieved 01/08/08  
<http://www.cdc.gov/rabies/exposure/preexposure.html>
4. Kreeger, T. J., J. M. Arnemo, and J. P. Raath. 2002. Handbook of Wildlife Chemical Immobilization, International Edition. Wildlife Pharmaceuticals Inc., Fort Collins, CO. 412 pp.
5. Heymann, D. L. 2004. Control of Communicable Diseases Manual, Eighteenth Edition. American Public Health Association, Washington D.C. 700 pp.
6. Training Requirements in OSHA Standards and Training Guidelines. U.S. Department of Labor Occupational Safety and Health Administration OSHA 2254 1998 (Revised).
7. Siegel J.D., Rhinehart E., Jackson M., Chiarello L., and the Healthcare Infection Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, June 2007.
8. Material safety and data sheets for many chemicals used in laboratory,  
[www.msdssearch.com](http://www.msdssearch.com).
9. A number of established zoonotic diseases of importance, ZED website at  
<http://inside.nps.gov/publichealth/zed/zed.htm>

## Definitions

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*Aerosol* – Solid particles or liquid droplets suspended in a gas (generally air).

*Aerosolized* – When liquid droplets or solid particles become suspended in air.

*Arthropod* – Animals belonging to the phylum Arthropoda which includes insects (e.g., mosquitoes, fleas, gnats) and arachnids (e.g., ticks, mites).

*CDC* – Centers for Disease Control and Prevention, a part of the U.S. Department of Health and Human Services, is the primary Federal agency responsible for conducting and supporting public health activities in the United States.

*Dedicated clothing* – Garments worn only during specific work activities which are not to be worn for office/personal activities (e.g., in offices, at home, in public venues).

*Dermal* – Referring to the skin. For example, dermal absorption means passing through the skin.

*Enzootic* – A disease that occurs at a regular, predictable, or expected rate in an animal population or area.

*Job Hazard Analysis (JHA)* – A JHA is a multi-step process designed to study and analyze a job.

*Mask* – A barrier worn over the nose and mouth to prevent droplet contamination of mucous membranes.

*Respirator* – A barrier worn over the nose and mouth that filters particulates of certain sizes from inhaled air. Particulate respirators are also known as "air-purifying respirators."

*Necropsy* – An examination and dissection of a dead animal to determine cause of death or the changes produced by disease.

*Pathogen* – A biological agent that causes disease or illness to its host (e.g., bacteria, viruses, or fungi).

*PPE* – Personal protective equipment.

*Vector* – For the purpose of this document: An arthropod capable of transmitting an infectious agent to other host species.

*Zoonoses* – Infectious diseases that can be transferred between domestic or wild animals and humans.

## Consultation

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