Monitoring and Maintenance Plan
Former James Mangan Park Rifle & Pistol Range

2140 34th Avenue
Sacramento, CA 95822
Stantec PN: 185704364

August 20, 2019

Prepared for:
City of Sacramento, Department of Public Works
5730 24th Street, Building 4
Sacramento, California 95822

Prepared by:
Stantec Consulting Services Inc.
3875 Atherton Road
Rocklin, California 95765

Sign Off Sheet

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Vice President, Environmental Services

Table of Contents

List of Attachments

LIST OF FIGURES

Note: Figures appear at end of report.

LIST OF APPENDICES

Glossary of Terms

CDPH	State of California, Department of Public Health
Contractor	All contracted firms that perform work at the Property (for example, contractors, subcontractors, consultants, and testing firms)
DOSH	Division of Occupational Safety and Health
Encapsulation	Process that makes a lead hazard inaccessible by providing a barrier between the lead hazard and the environment
Entek	Entek Consulting Group, Inc.
EPA	Environmental Protection Agency
HUD	United States Housing and Urban Development
JM	JM Environmental, Inc. Specialty Contractors
LBP	Lead-based paint
LCP	Lead-containing paint
MMP	Monitoring and Maintenance Plan
RRP	Renovation, Repair, and Painting
µg/ft^2	micrograms per square foot
SCEMD	Sacramento County Environmental Management Department
Work Area	Area of project which receives “abatement” or is contaminated

1.0 INTRODUCTION AND PURPOSE OF THE MONITORING AND MAINTENANCE PLAN

It is the intent of this manual to provide an effective Monitoring and Maintenance Plan (MMP) for the former James Mangan Park Rifle & Pistol Range located at 2140 34th Avenue, Sacramento, California 95822 (the "Property"). The Property owner is committed to providing a safe environment for all personnel, tenants, and contractors who currently work at or will otherwise enter the Property.

The primary objective of this MMP is to incorporate key elements of the United States Housing and Urban Development (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, Chapters 6 and 13 (herein referred to as 'HUD Guidelines') for management of lead hazards. The HUD Guidelines are applicable to residential properties and child occupied facilities. Furthermore, the HUD Guidelines are largely focused on lead-based paint (LBP) and subsequent hazards associated with LBP. The Property is not a residential structure, nor a child occupied facility, and the source of the lead hazards associated with this project were mostly attributable to the use of lead ammunition within the building. However, the State of California, Department of Public Health (CDPH) extends some of the components of the HUD Guidelines to public buildings.

This MMP includes specific practices and procedures as they apply to maintenance and general operations. The MMP shall remain in effect until all lead hazards have been removed from the Property and are properly documented as such.

This MMP was established specifically to provide the following information:

- Periodic visual assessment of encapsulated areas inside and on the exterior of the building as well as areas known to contain LBP. It is expected that this visual assessment will be conducted within the first month of plan approval with a six-month follow-up assessment. Additional assessments will be performed as needed, but at least annually.
- A description of the certification requirements of the individual that will perform the visual assessments.
- Record-keeping requirements for documenting visual assessments including the use of applicable HUD forms.
- Development of a figure illustrating the known presence of LBP and other lead containing materials at the Property.

2.0 PROPERTY DESCRIPTION AND LEAD FINDINGS

2.1 PROPERTY DESCRIPTION

The former James Mangan Park Rifle & Pistol Range building is approximately 7,980 square feet in size and was initially constructed in 1960 at 2140 34th Avenue, Sacramento, California. The Property ceased operations as a gun range in 2014 and has received extensive lead remediation and abatement. The Property is currently vacant and is not intended to be a residential structure or child occupied facility. The source of lead hazards associated with this project were mostly attributable to the use of lead ammunition within the building. Former firing range activities at the Property resulted in the dispersion of lead dust from bullets throughout the building, rather than accumulation of lead dust from deterioration of painted surfaces.

2.2 LEAD FINDINGS

Assessment work completed by the City in 2014 and 2016 identified lead contamination within the building, on a portion of the roof, and on some exterior surfaces (such as the concrete walkway and exterior door handles). Concentrations of lead dust on surfaces exceeded CDPH criteria established in Title 17 as lead hazards. The lead dust-impacted portion of the roof was cleaned and sealed in 2016, and exterior door handles were cleaned. The exterior concrete walkway leading to the main entry door was removed in 2017. In January 2019, the City contracted with JM Environmental, Inc. Specialty Contractors (JM) to remove and dispose of all lead dust-contaminated interior non-load bearing walls, fixtures, equipment, and materials. Remaining surfaces within the building were cleaned. The remediation included removal of bulk lead waste associated with the bullet trap area within the range room. Following removal of various building materials and completion of the cleaning process, JM applied a lead encapsulating coating to interior floors throughout the Property and to some interior portions of walls and ceilings. The remediation project was described in the *Lead Remediation Work Plan* developed by Stantec and dated December 7, 2018. The remediation work plan was approved by Sacramento County Environmental Management Department (Sacramento EMD) in correspondence dated December 21, 2018. Remediation activities were performed by JM between February and April 2019.

Stantec performed post-remediation visual assessment and confirmation wipe sampling on interior surfaces within the building following remediation efforts completed by JM. The work was completed in accordance with CDPH and HUD criteria. While CDPH promulgates their own regulations for *Accreditation, Certification and Work Practices For Lead-Based Paint and Lead Hazards* under Title 17, California Code of Regulations, Division 1, Chapter 8, Section 35001 eq seq., they refer to the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* for the purposes of clearance testing. The HUD guidelines are an extension of the United States Environmental Protection Agency's Residential Lead-Based Paint Hazard Reduction Act of 1992 (commonly referred to as 'Title X').

More specifically, the Environmental Protection Agency (EPA) regulations for *Lead-Based Paint Poisoning Prevention in Certain Residential Structures* are found in 40 CFR Part 745. Although the HUD guidelines and EPA regulations are generally related to residential housing and child-occupied facilities, the CDPH regulations also apply to buildings accessible to the public. For this reason, post-remediation confirmation wipe sampling was completed in accordance with Chapter 15 of HUD guidance for lead clearance sampling. Following three rounds of post-remediation wipe sampling, all tested surfaces within the former gun range building at the date and time the samples were collected were below applicable CDPH and HUD criteria for unrestricted use at the time the work was performed. A *Lead Confirmation Sampling Report* was issued by Stantec on April 30, 2019.

A brief summary of the 2014 and 2016 assessment findings, prepared by Entek Consulting Group, Inc. (Entek) are presented below. Copies of the Entek 2014 and 2106 reports as well as Stantec's April 2019 report are included as **Appendix B**.

November 2014 Entek Summary

Table 1: List of sample results for lead by surface type in each room. Results expressed in micrograms per square foot (ug/ft^2).

	Floors	Walls	Ceiling Level Surfaces	Cabinets / Shelves / Waist Level Surfaces	Desks / Counters / Tables	Furniture	Bullet Targets
Gun Range	17,000 12,000		42,000	5,600 940 760 27,000	3,000	20,000	70,000
Locker Area	8,400			8,200		8,800	530
Entry Lobby	6,800				360		
Men's RR	3,200			3,500			
Women's RR	1,200			690			
Rec Room	3,600	1,300			680	2,200 1,400	
Classroom	3,800		12,000	10,000	160		
Kitchen	2,100			3,500 3,400	530		
Stat Office	13,000			4,100	2,100		

April 2016 Entek Summary

Table 1 Lead Surface Wipe Samples	
Location of Wipe Sample	**Results ($\mu g/ft^2$)**
Pistol and Rifle Range Building Roof - Upper Level Roof at Center of North Side	2,300 *
Door Handles of Main North Entry Door of Pistol & Rifle Range Building	2,200 *
Concrete Walkway Leading to Main North Entry Door of Pistol & Rifle Range Building	1,500 **

$\mu g/ft^2$ = micrograms per square foot
* = Cleaned/sealed 2016
** = Removed 2017

June 2016 Entek Summary

Paints/Coatings/ Materials Determined to be Lead Based Paint (LBP)		
Paint/Coating Color or Material	**Lead Content**	**Component/Location**
Brown Colored Paint	7,900 ppm	Metal Hand Railings - Firing Range Room *
Brown Colored Paint	52,000 ppm	Wood Fascia - Exterior of Building
4" Ceramic Wall Tile Glaze	Assumed >5,000 ppm	4" Ceramic Tile - Men's Restroom *

Paints/Coatings/ Materials Determined to be Lead Containing Paint (LCP)		
Paint/Coating Color or Material	**Lead Content**	**Component/Location**
Green Colored Paint	3,400 ppm	Concrete Walls - Firing Range Room **
Brown Colored Paint	4,800 ppm	Metal Stalls - Firing Range Room *
White Colored Paint	210 ppm	Wood Roof Joists - Throughout Building Except Firing Range Room **
Varnish	3,500 ppm	Wood Walls, Doors, & Counters - Break Room, Kitchen, Classroom, Office *
Beige Colored Paint	2,900 ppm	Wood Roof Joists - Firing Range Room **
Red Colored Coating	300 ppm	Concrete Floor - Throughout Building **
Brown Colored Paint	4,100 ppm	Wood Door Frames - Entry Doors
Beige Colored Paint	230 ppm	Concrete Walls - Exterior of Building

ppm = parts per million
* = Removed 2019
**= Encapsulated 2019

3.0 MONITORING AND MAINTENANCE PLAN REQUIREMENTS

The MMP generally follows the recommendations of Chapters 6 and 13 of HUD Guidelines, as further clarified in applicable sections below.

Lead-safe maintenance is necessary because the potential exists for lead hazards to develop wherever lead is present. The purposes of ongoing lead-safe maintenance are: (1) to assure that if potential lead hazards occur or reoccur, they will be spotted and controlled promptly; and (2) to assure that maintenance and renovation work that disturbs lead will not cause lead exposure during the work and will not contaminate the nearby environment with leaded-dust when the work is finished. If ongoing lead-safe maintenance is done with care, the probability of lead exposure from lead-based paint hazards on the Property is significantly reduced.

Copies of HUD Chapters 6 and 13 are provided in **Appendix C**.

4.0 VISUAL ASSESSMENT

Periodic visual assessments shall be conducted to identify deteriorated paint, unusual amounts of visible dust, paint-related debris, failed lead hazard controls (particularly encapsulations), chewable encapsulated surfaces with evidence of teeth marks (optional), and problems (structural and otherwise) that may be causing some of the foregoing conditions.

Because lead testing and/or control has been conducted in the areas to be visually assessed, it is important for the person performing the visual assessment to have information regarding the location of known lead hazards and the type and location of each control or treatment of a lead hazard that is readily accessible to the visual assessor. Figure 1, provided as an attachment to the MMP, illustrates the locations of various lead containing materials and encapsulation locations within the building at the Property. Figure 2 illustrates lead containing materials and sealed surfaces on the roof of the building and on external surfaces.

4.1 SCHEDULE

Following the HUD recommendations found in Chapters 6 and 13, visual assessments shall be conducted at the following times:

- Whenever the owner receives a complaint regarding paint deterioration or other potential lead hazard at the Property.
- Whenever the Property turns over or becomes vacant.
- Whenever significant damage occurs (i.e., flooding, fire, structural damage).
- At least once every year.

Copies of various HUD visual assessment forms are provided in **Appendix D**.

4.2 CERTIFICATION REQUIREMENTS

It is not necessary to be a certified lead-based paint inspector, risk assessor or renovator to perform visual assessments for ongoing lead-safe maintenance, but people performing visual assessments must be trained to do so. Owners, managers, or maintenance staff can perform visual assessments and lead-safe work practices with only modest training. Lead-safe work practices are modifications to traditional maintenance and renovation methods (refer to HUD guidelines for additional detail). Clearance examinations, however, must be done by a certified professional.

Visual assessments must be performed by individuals trained in performing them. Training in performing visual assessments is available online on the HUD lead website (https://apps.hud.gov/offices/lead/training/visualassessment/h00101.htm). This course takes approximately one hour to complete and is available as a self-paced, web-based training module. This

module also includes the option to print a notice of course completion, which should be kept in the visual assessor's file.

It is also recommended that owners and managers give those performing visual assessments a brief orientation or information on types of lead hazards present, controls that have been used at the Property, and any additional considerations that the owner wants to identify in the assessment.

4.3 RECORD-KEEPING REQUIREMENTS

The results of visual assessments and any corrective measures taken shall be documented, and such reports shall be retained until all lead hazards have been eliminated from the Property. Reports that document ongoing lead-safe maintenance may provide some degree of protection against charges of negligence.

The owner or manager shall keep the following items to facilitate and document the lead-safe maintenance program: reports of visual assessments, a log of the dates of visual assessments, an inventory of lead-based paint testing results or presumption of lead-based paint or hazards, an inventory of lead hazard controls, lead-safe maintenance work orders, supporting photographs, and reports of clearance examinations. Additional information regarding recordkeeping is included in HUD Chapter 13. A copy of this chapter is provided in **Appendix C**.

5.0 LEAD-SAFE WORK PRACTICES DURING FUTURE MAINTENANCE AND CONSTRUCTION

Workers performing maintenance or renovation work at the Property shall be trained in lead-safe work practices and shall be instructed on how to perform visual assessments in conjunction with normal duties. The supervisors of these workers must be certified renovators, and if the Owner retains the services of a contractor to perform maintenance or renovation work, the contractor performing the work must also be a certified renovation firm when the work may disturb LBP in amounts above the EPA's 'minor repair and maintenance activities' threshold (interior surfaces of less than six-square feet per room). This MMP will act as the system to inform maintenance project supervisors and maintenance workers when a job may involve a lead hazard or LBP.

The following section provides a basic overview of the administrative requirements for controlling lead hazards. Complete guidance for lead safe work is provided on the HUD website: https://www.hud.gov/program_offices/healthy_homes/lbp/hudguidelines.

Applicable State of California information is available on the CDPH website: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/CLPPBhome.aspx.

Worker protection regulations for lead related construction can be found on the State of California, Division of Occupational Safety and Health (DOSH aka CalOSHA) website: https://www.dir.ca.gov/title8/1532_1.html.

5.1 LEAD-SAFE WORK PRACTICES

Property owners and managers of publicly accessible buildings must ensure that the maintenance firms and workers conducting work covered by the EPA's Renovation, Repair, and Painting (RRP) Rule are certified renovation firms which have the work supervised by certified renovators and the workers either certified renovators or trained under the RRP Rule.

With traditional building maintenance practices, disturbance of surfaces containing lead can turn a potential problem into an immediate hazard. However, if maintenance practices are modified to provide sufficient protection to occupants, workers, and the environment, lead hazards associated with maintenance and renovation work can be controlled.

Lead-safe work practices are essential even for small-scale jobs. The HUD Guidelines recommend them even for jobs for which HUD and EPA regulations do not require them.

Owners shall repair or replace any previous lead hazard control treatments that are no longer performing as designed. For example, encapsulations may become loose/peeling from the substrate.

Lead-contaminated dust exposures are typically controlled by the following:

A. Using wet methods when sanding, scraping, or sweeping.

B. Using vacuums equipped with High Efficiency Particulate Air (HEPA) filters.

C. Covering floors and furnishings with disposable and impermeable protective sheeting such as polyethylene.

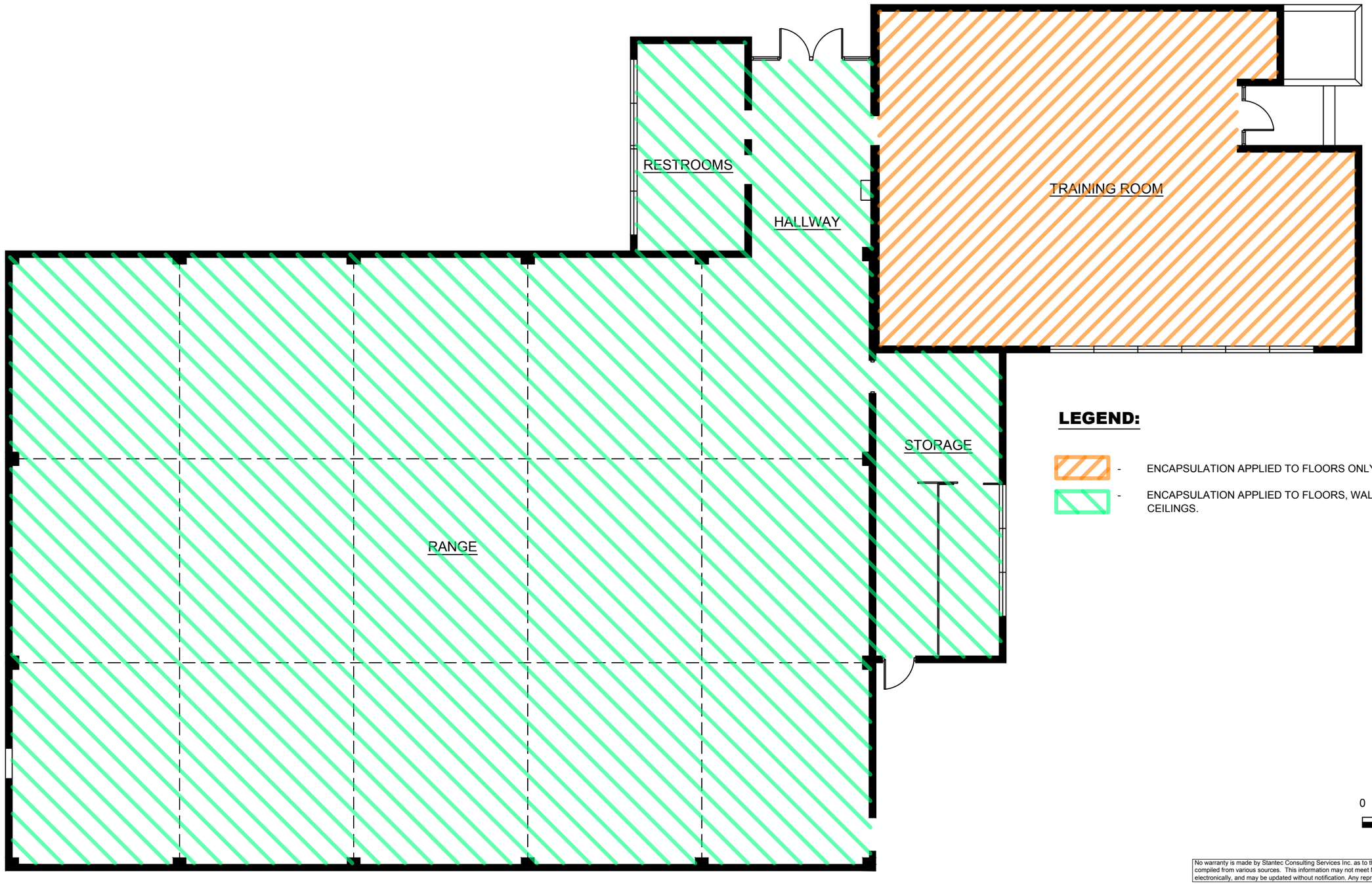
D. Using foot coverings, dedicated footwear, and walk-off mats to minimize tracking leaded-dust out of the work area.

E. Sealing rooms to avoid contamination of adjacent areas.

F. Using approved respirators.

HUD recommends that clearance examinations be performed after completion of maintenance and renovation work and associated clean-up when work exceeds a 'de minimis' threshold of two square feet per room, or 10 percent of a small component type (such as a door frame). EPA requires clearance after abatement projects, but not after other work. A clearance examination consists of a visual assessment for deteriorated paint, dust and debris, taking samples of dust on horizontal surfaces, and testing the samples for lead. Clearance examiners should wait a minimum of one hour after the final clean-up of the work before collecting wipe samples of dust. Analytical testing shall be done by a laboratory recognized by EPA for analysis of lead in wipe samples. Workers and supervisors performing clean-up activities will not be informed of where the wipe samples will be taken. Clearance wipe sampling shall be performed by a person certified to perform clearance examinations in the State (usually a risk assessor, a lead-based paint inspector, or a sampling technician).

FIGURES



LEGEND:

- ENCAPSULATION APPLIED TO FLOORS ONLY.
- ENCAPSULATION APPLIED TO FLOORS, WALLS, AND CEILINGS.

N

0 10 20

APPROXIMATE SCALE IN FEET

Stantec

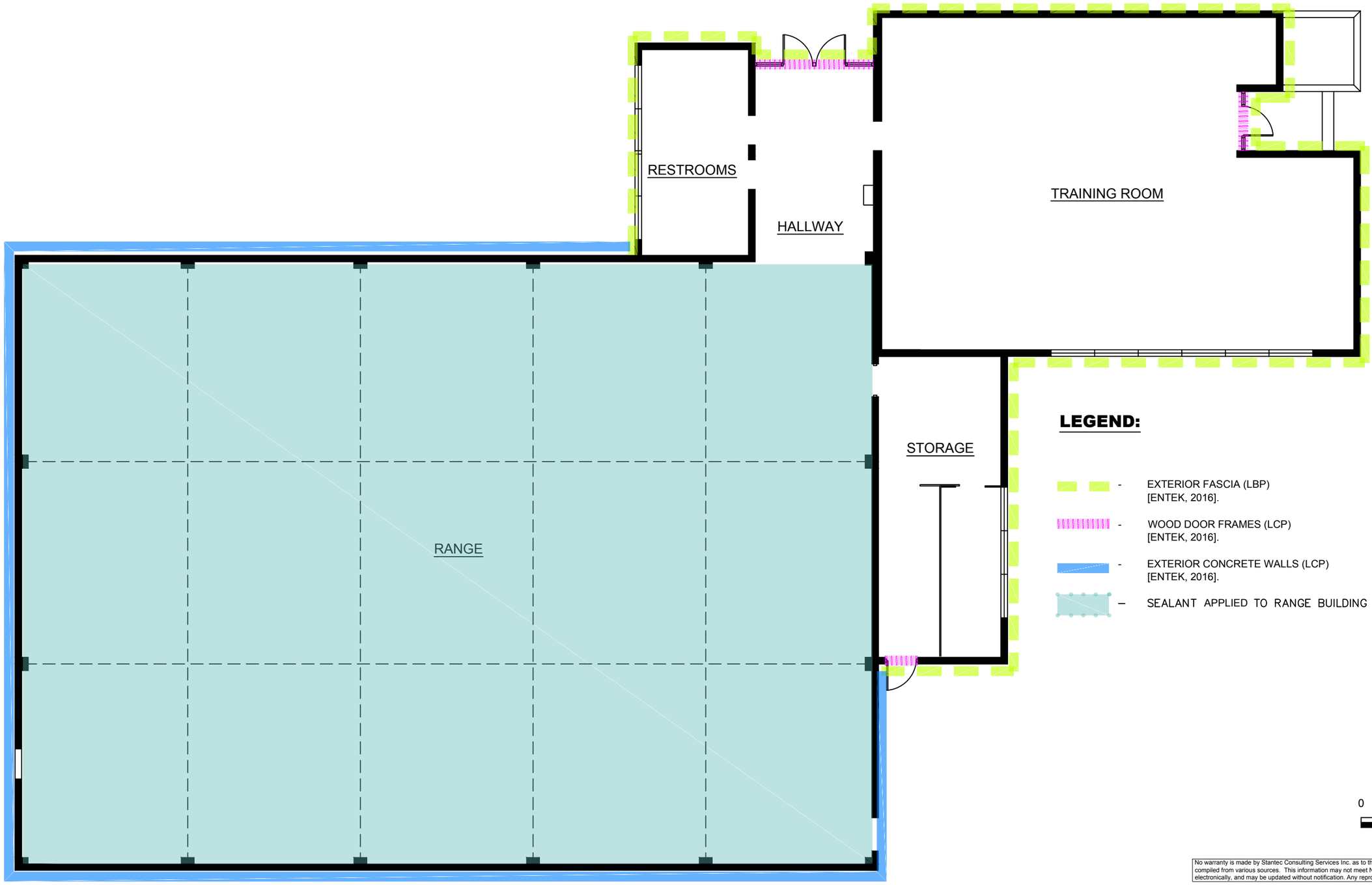
FOR:
CITY OF SACRAMENTO
FORMER MANGAN PISTOL & RIFLE RANGE
2140 34th AVENUE
SACRAMENTO, CA. 958322-3157

INTERIOR LEAD CONTAINING MATERIALS

FIGURE: **1**

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
185704364	STA	DSM	NHD	07/14/19

FILEPATH:V:\1857\active\2019 Working Files\MANGAN GUN RANGE\FIG 1_Mangan_INTERIOR LEAD CONTAINING MATERIALS_07-24-2019.dwg | Layout Tab: 1 | Drafter: saguinaldo | Jul 24, 2019 at 16:35



LEGEND:

- EXTERIOR FASCIA (LBP) [ENTEK, 2016].
- WOOD DOOR FRAMES (LCP) [ENTEK, 2016].
- EXTERIOR CONCRETE WALLS (LCP) [ENTEK, 2016].
- SEALANT APPLIED TO RANGE BUILDING ROOF

N

0 10 20

APPROXIMATE SCALE IN FEET

Stantec

FOR:
CITY OF SACRAMENTO
FORMER MANGAN PISTOL & RIFLE RANGE
2140 34th AVENUE
SACRAMENTO, CA. 958322-3157

EXTERIOR LEAD CONTAINING MATERIALS

FIGURE: **2**

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
185704364	STA	DSM	NHD	07/24/19

FILEPATH:V:\1857\active\2019 Working Files\MANGAN GUN RANGE\FIG 2_Mangan_EXTERIOR LEAD CONTAINING MATERIALS_07-24-2019.dwg | Layout Tab: 2 | Drafter: saguinaldo | Jul 24, 2019 at 16:12

APPENDIX A

Preparer's Certification

California Department of PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
	Lead Inspector/Assessor	LRC-00000740	7/7/2020
	Lead Project Monitor	LRC-00000746	7/7/2020

Dean Mochrie

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

APPENDIX B

Prior Reports

ENTEK
CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7, Rocklin, CA 95677 Telephone (916) 632-6800 Fax (916) 632-6812 www.entekgroup.com

November 20, 2014

Ms. Laura Greer
Hazardous Materials Division Manager
PARC Specialty Contractors, Inc.
1400 Vinci Avenue
Sacramento, CA 95838

Re: Mangan Rifle and Pistol Range, 2140 34th Avenue; Sacramento, CA; Report of Assessment for Lead

Dear Ms. Greer;

The report presents results of the limited lead risk assessment by Entek Consulting Group, Inc. (Entek) at the Mangan Rifle and Pistol Range located at the above address in Sacramento. You requested our assistance in assessing the lead dust levels inside of this building owned and operated by the City of Sacramento. The lead assessment by Entek was limited in scope and only included surface dust sampling inside of the building and on the roof of the building to determine lead loading on the various surfaces. This investigation did not include lead in paint assessment or lead-based paint inspection of painted components associated with the building, or testing of water or soil at the facility.

Lead Risk Assessment

Lead hazards or "lead-contaminated dust" is defined by the California Department of Public Health (CDPH) Title 17 as dust that "contains an amount of lead equal to, or in excess of: (a) forty micrograms per square foot (40 ug/ft²) for interior floor surfaces; or (b) two hundred and fifty micrograms per square foot (250 ug/ft^2) for interior horizontal surfaces; or (c) four hundred micrograms per square foot (400 ug/ft^2) for exterior floor and exterior horizontal surfaces". In addition, lead hazards in soil have been identified as lead equal to ro in excess of 400 ppm in children's play areas, and 1,000 ppm in all other areas.

The limited lead risk assessment was conducted on November 17, 2014, by Mr. Blake Howes, a CDPH certified Lead Inspector/Assessor to evaluate lead hazards associated with lead dust on surfaces. The lead risk assessment included collection of wipe samples of numerous surfaces of the floors, walls, shelves, desks, tables, furniture, horizontal surfaces of components near the ceiling floor areas in many areas of the building. Entek collected a total of 39 bulk samples of dust from surfaces within the building and on the roof of the building. Surface wipe samples were collected using Ghost Wipe samples meeting the ASTM E 1792 materials for collection and analysis of wipe samples for lead. One blank Ghost Wipe sample was submitted for analysis in addition to the 39 samples collected at the project site. The samples were delivered to Forensic Analytical Laboratories, Inc. (FASI) located in Hayward, CA and were analyzed by flame atomic absorption spectroscopy (AAS). FASI is certified by the State of California Department of Public Health Environmental Laboratory Accreditation Program to analyze these types of samples and is accredited by the Environmental Lead Laboratory Accreditation Program (ELLAP) administered by AIHA.

Observations

The Range Building is a single story structure on a concrete slab foundation with brick & stucco exterior finishes and a multi-tier composition asphalt rolled roof. Interior floors are smooth concrete with an applied finish coat, walls are a mix of concrete, brick, and wood wall paneling. Ceilings are the underside of the wooden roof deck, painted white in most locations. Settled dust is visible in most locations throughout the interior of the building on floors, shelves, cabinets, counter tops, etc.

For the purposes of this investigation the interior spaces have been divided into nine separate locations as follows: gun range, locker rooms, entry lobby, men's restroom, women's restroom, rec room, classroom, kitchen, and stat office.

Gun Range: This room is the largest in the building, with various benches, bleachers, shelves, and tables at the east end and angled metal plates at the west end. Bullets are fired across the room from the east side benches to the west side metal plates. Angled metal plates are present in multiple locations in the center of the range at ceiling height to provide bullet deflection. Metal railing and track systems are also present at ceiling height for target carriage.

The angled metal plates at the west end of the room direct the fired bullets down into a bullet trap area that is mainly inaccessible from the main room. An exterior access door on the west side of the building provides access to the underside of the angled metal plates. This area has visible lead debris on all surfaces.

Six exhaust fans are located throughout the room, with multiple air intake vents located along the east side of the ceiling. The exhaust fan intake areas are visibly discolored as well as the roofing materials surrounding the exhaust fan housings on the exterior of the building.

Lockers: Two rooms comprise the locker room and storage areas. Lockers, cabinets, and a locked metal cage are present in this area. Padded cloth shooting mats are piled together beneath movable cardboard shooting targets in one area of the room.

Entry Lobby: The main entry area contains a desk and several chairs along with the entrances to the restrooms, gun range, and rec room.

Men's RR: A small restroom with a sink, single toilet stall, and two urinals. Visible flaking paint is present on the window sill above the sink and urinals.

Women's RR: A small restroom with a sink and single handicap toilet stall.

Rec Room: This room contains several padded leather couches, a padded leather chair, television, a wall mounted counter top, and a serving area that connects to the kitchen. Many cloth patches, hangings, pictures, and banners are present on the walls and ceilings in this area.

Classroom: This space contains tables, shelves, and cabinets throughout the area. Two window mounted AC units and a ceiling mounted heater unit are found in the room. Air rifle targets are set up at the east side of the room, which is presumably also used for air rifle practice.

Kitchen: The kitchen contains counter tops, a sink, a serving counter that connects to the rec room, a fridge, oven, and microwave. Pots and pans with visible dust accumulation are present on the shelves in the room.

Stat Office: This room contains a desk, tables, shelves, cabinets, and a washing machine.

Sampling Methods

Bulk samples were collected using Ghost Wipe sample media to collect the surface dust from the sample component. New nitrile gloves were worn for each sample and discarded after each sample to minimize contamination of the samples. Where possible, one square foot of surface was sampled. A pre-cut paper template 12" x 12" in size was secured to the surface to be tested and the interior of the template opening surface area was wiped with the Ghost Wipe horizontally, and vertically, after folding inward the used portion of the Ghost Wipe. Samples were placed into a plastic centrifuge container, sealed and labeled with a unique sample identification number. All sample location, size of the sample and surface sampled is included in the chain of custody forms, which are attached to this report.

All samples were analyzed for lead by the NIOSH 9100/7082 method by Forensic Analytical Laboratories, Inc. with results reported in micrograms per square foot (ug/ft^2). Table I is a summary of the results of the testing of the interior of the building and Table 2 is a summary of the results of the testing from the roof.

Table 1: List of sample results for lead by surface type in each room. Results expressed in micrograms per square foot (ug/ft^2).

	Floors	Walls	Ceiling Level Surfaces	Cabinets / Shelves / Waist Level Surfaces	Desks / Counters / Tables	Furniture	Bullet Targets
Gun Range	17,000 12,000		42,000	5,600 940 760 27,000	3,000	20,000	70,000
Locker Area	8,400			8,200		8,800	530
Entry Lobby	6,800				360		
Men's RR	3,200			3,500			
Women's RR	1,200			690			
Rec Room	3,600	1,300			680	2,200 1,400	
Classroom	3,800		12,000	10,000	160		
Kitchen	2,100			3,500 3,400	530		
Stat Office	13,000			4,100	2,100		

Floors: Samples collected from concrete floors with a finish coating

Walls: One sample collected in rec room with cloth wall hangings, plaques, and wood paneled walls

Ceiling Level Surfaces: One sample collected from the top of the angled metal deflection plate in the gun range near ceiling height, and one sample collected from the top of a heater unit near the ceiling in the classroom

Cabinets/Shelves/Waist Level Surfaces: Samples collected from tops of cabinets and lockers, from shelves in wood or metal shelving units, and various waist to chest high horizontal surfaces.

Desks/Counters/Tables: Samples collected from surfaces where it can be reasonably assumed people will be sitting or working and resting their arms or hands.

Furniture: Samples collected from bleachers, leather couches, leather chairs, and cloth shooting mats.

Bullet Targets: Samples collected from angled metal plates in gun range and movable cardboard targets stored in locker room area.

Table 2: List of sample results for roof surfaces. All samples collected from the roof area directly above gun range room. Results expressed in micrograms per square foot (ug/ft^2).

	Roof Field over Gun Range	Roof at Gun Range Exhaust Fan	Gun Range Exhaust Fan Housing
Roof	440	7,000	19,000

Roof Field: Sample taken at least 10 feet away from any exhaust fan on composition asphalt roofing.

Roof at Exhaust Fan: Sample taken from area of visible gray discoloration directly adjacent to exhaust fan on composition asphalt roofing.

Exhaust Fan Housing: Sample taken on top of metal exhaust fan.

Discussions and Recommendations

This lead assessment identified lead in surface dust in all 39 bulk samples collected ranging between 160 ug/ft^2 collected at the surface of table in the classroom to a high of 70,000 ug/ft^2 collected at the bullet shield at the east end of the Gun Range. Lead concentrations on the surface of the roof of above the Gun Range were between 440 ug/ft^2 at the center of the roof to 19,000 ug/ft^2 on the surface of the exhaust vent housing. Clearly, there is extensive lead contamination inside of the building in every room and on the roof of the building. Entek did not assess the lead in the soil in the immediate surrounding area of the building where lead from the roof would presumably have settled from rain and wash off from the roof.

The current concentrations of lead on surfaces exceed the CDPH criteria established in Title 17 as lead hazards, which are those as having lead dust on interior floor surfaces at or greater than 40 ug/ft^2, at or greater than 250 ug/ft^2 on interior horizontal surfaces or at or greater than 400 ug/ft^2 on exterior floors or exterior horizontal surfaces. This criteria might be considered as a starting point to meet for clearance following remediation that may take place. The CDPH Title 17 standard is designed for a single family residence or building structure where children will be present to prevent childhood lead poisoning. The firing range is not a child care facility; however, children might visit the facility and be in the Rec Room, Kitchen, Main Entry or Restrooms where high lead levels have been detected, therefore the need for the clearance criteria to meet the CDPH Title 17 criteria might be warranted.

Any clean-up work that will be undertaken at this facility should be performed by a contractor with CDPH certified lead Workers and certified Lead Supervisors in accordance with Title 17 requirements. Requirements in Title 17 must be followed, since a lead hazard has been identified at this building. In addition, the contractor performing remediation work at this site are required to comply with the work practices, training, and personal protective practices required by Cal/OSHA in 8 CCR 1532.1.

Attached to this report are the chain of custody (COC) forms, laboratory reports, schematics identifying sample locations, photographs of various test locations, laboratory accreditation information and certification of Entek staff.

Entek's policy is to retain a full copy of these written documents for three (3) years once the file is closed and final billed. At the end of the three (3) year period the written files will be destroyed without further notice. It is suggested copies of the file(s) are maintained per the owner's policy.

Entek has will be providing only this electronic copy of the report and its attachments for your use. However, if you would like a hard copy of this report please do not hesitate to ask. Entek will be happy to mail the report upon receipt of your request.

Please forward a copy of this report to all interested parties for review. Thank you for choosing Entek for your environmental needs. If you have any questions with this report please call at (916) 632-6800 or on my cell phone at (916) 417-5276.

Sincerely,

Rick Beall, CIH, CSP
President
CDPH Lead Certification #769

Attachments

Z:\Clients\PARC Specialty Contractors\14-3323 Mangan Gun Range - Indoor Firing Range - Lead\Project Letters & Reports\Final Lead Assessment Report 11-20-14.wpd

ENTEK

BULK MATERIAL *Analysis Report*

LEAD WIPE SAMPLING

ENTEK CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Lab: Forensic Analytical Laboratories

Job Number: 14-3323

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Client Name: PARC Specialty Contractors

Collected by: Blake Howes

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

SAMPLE #	RESULTS LEAD ($\mu g/ft^2$)	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-01Wipe	17000	Lead Dust Wipe - Gun Range - Floor at Bullet Trap	12" X 12"
ECG-14-3323-02Wipe	12000	Lead Dust Wipe - Gun Range - Floor at Shooting Rests	12" X 12"
ECG-14-3323-03Wipe	5600	Lead Dust Wipe - Gun Range - Cabinet Shelf	12" X 12"
ECG-14-3323-04Wipe	940	Lead Dust Wipe - Gun Range - Gun Rest Counter/Shelf	12" X 12"
ECG-14-3323-05Wipe	20000	Lead Dust Wipe - Gun Range - Bleachers	12" X 12"
ECG-14-3323-06Wipe	760	Lead Dust Wipe - Gun Range - Shooting Rest Benches	12" X 12"
ECG-14-3323-07Wipe	27000	Lead Dust Wipe - Gun Range - Control Station Shelf	12" X 12"
ECG-14-3323-08Wipe	42000	Lead Dust Wipe - Gun Range - Bullet Shield Near Ceiling	12" X 12"
ECG-14-3323-09Wipe	70000	Lead Dust Wipe - Gun Range - Bullet Shield at End of Range	12" X 12"
ECG-14-3323-10Wipe	3000	Lead Dust Wipe - Gun Range - Shooting Rest Moveable Bench	12" X 12"
ECG-14-3323-11Wipe	8400	Lead Dust Wipe - Locker Room at Floor	12" X 12"
ECG-14-3323-12Wipe	8200	Lead Dust Wipe - Locker Room at Locker/Cabinet Top	12" X 12"
ECG-14-3323-13Wipe	8800	Lead Dust Wipe - Locker Room at Movable Shooting Mat	12" X 12"
ECG-14-3323-14Wipe	530	Lead Dust Wipe - Locker Room at Moveable Cardboard Target	12" X 12"

ENTEK

BULK MATERIAL *Analysis Report*

LEAD WIPE SAMPLING

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PHONE (916) 632-6800
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Date of Sampling: November 17, 2014

Lab: Forensic Analytical Laboratories

Job Number: 14-3323

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Client Name: PARC Specialty Contractors

Collected by: Blake Howes

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

SAMPLE #	RESULTS LEAD ($\mu g/ft^2$)	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-15Wipe	6800	Lead Dust Wipe - Main Entry Lobby at Floor	12" X 12"
ECG-14-3323-16Wipe	360	Lead Dust Wipe - Main Entry Lobby at Desk	12" X 12"
ECG-14-3323-17Wipe	3200	Lead Dust Wipe - Men's Restroom at Floor	12" X 12"
ECG-14-3323-18Wipe	3500	Lead Dust Wipe - Men's Restroom at Sill	4" X 36"
ECG-14-3323-19Wipe	1200	Lead Dust Wipe - Women's Restroom at Floor	12" X 12"
ECG-14-3323-20Wipe	690	Lead Dust Wipe - Women's Restroom at Trashcan Lid	12" X 12"
ECG-14-3323-21Wipe	3600	Lead Dust Wipe - Rec Room at Floor	12" X 12"
ECG-14-3323-22Wipe	2200	Lead Dust Wipe - Rec Room at Couch	12" X 12"
ECG-14-3323-23Wipe	1400	Lead Dust Wipe - Rec Room at Chair	12" X 12"
ECG-14-3323-24Wipe	680	Lead Dust Wipe - Rec Room at Counter	12" X 12"
ECG-14-3323-25Wipe	1300	Lead Dust Wipe - Rec Room at Wall with Wall Hangings	12" X 12"
ECG-14-3323-26Wipe	3800	Lead Dust Wipe - Classroom at Floor	12" X 12"
ECG-14-3323-27Wipe	160	Lead Dust Wipe - Classroom at Table	12" X 12"
ECG-14-3323-28Wipe	10000	Lead Dust Wipe - Classroom at Shelf	12" X 12"

ENTEK

BULK MATERIAL *Analysis Report* — *LEAD WIPE SAMPLING*

ENTEK CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Lab: Forensic Analytical Laboratories

Job Number: 14-3323

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Client Name: PARC Specialty Contractors

Collected by: Blake Howes

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

SAMPLE #	RESULTS LEAD ($\mu g/ft^2$)	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-29Wipe	12000	Lead Dust Wipe - Classroom at Heater	12" X 12"
ECG-14-3323-30Wipe	2100	Lead Dust Wipe - Kitchen at Floor	12" X 12"
ECG-14-3323-31Wipe	530	Lead Dust Wipe - Kitchen at Serving Area	12" X 12"
ECG-14-3323-32Wipe	3500	Lead Dust Wipe - Kitchen at Microwave Top	12" X 12"
ECG-14-3323-33Wipe	3400	Lead Dust Wipe - Kitchen at Pots on Shelf	12" X 12"
ECG-14-3323-34Wipe	13000	Lead Dust Wipe - Stat Office at Floor	12" X 12"
ECG-14-3323-35Wipe	2100	Lead Dust Wipe - Stat Office at Table	12" X 12"
ECG-14-3323-36Wipe	4100	Lead Dust Wipe - Stat Office at Shelf	12" X 12"
ECG-14-3323-37Wipe	440	Lead Dust Wipe - Roof at Center Field	12" X 12"
ECG-14-3323-38Wipe	7000	Lead Dust Wipe - Roof at Vent Exhaust	12" X 12"
ECG-14-3323-39Wipe	19000	Lead Dust Wipe - Roof at Top of Exhaust Fan Housing	12" X 12"
ECG-14-3323-40Wipe	< 8	Blank - Lead Dust Wipe; Ghost Wipe	N/A

Z:\Clients\PARC Specialty Contractors\14-3323 Mangan Gun Range - Indoor Firing Range - Lead\Lead Wipe\LeadWipeReport 11-17-14.wpd

Forensic Analytical Laboratories

Metals Analysis of HUD Wipes

Entek Consulting Group
Project Manager
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M155930
Date Received: 11/18/14
Date Analyzed: 11/19/14
Date Printed: 11/19/14
First Reported: 11/19/14

Job ID / Site: 14-3323, PARC Specialty Contractors, Mangan Gun Range, 2140 34th Avenue, Sacramento, CA
Date(s) Collected: 1/17/14

FALI Job ID: A31353
Total Samples Submitted: 10
Total Samples Analyzed: 10

Sample Number	Lab Number	Area ft2	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-14-3323-01WIPE	30700203	1.00	Pb	17000	ug/ft2	800	NIOSH 9100/7082
ECG-14-3323-02WIPE	30700204	1.00	Pb	12000	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-03WIPE	30700205	1.00	Pb	5600	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-04WIPE	30700206	1.00	Pb	940	ug/ft2	30	NIOSH 9100/7082
ECG-14-3323-05WIPE	30700207	1.00	Pb	20000	ug/ft2	800	NIOSH 9100/7082
ECG-14-3323-06WIPE	30700208	1.00	Pb	760	ug/ft2	30	NIOSH 9100/7082
ECG-14-3323-07WIPE	30700209	1.00	Pb	27000	ug/ft2	800	NIOSH 9100/7082
ECG-14-3323-08WIPE	30700210	1.00	Pb	42000	ug/ft2	2000	NIOSH 9100/7082
ECG-14-3323-09WIPE	30700211	1.00	Pb	70000	ug/ft2	4000	NIOSH 9100/7082
ECG-14-3323-10WIPE	30700212	1.00	Pb	3000	ug/ft2	200	NIOSH 9100/7082

Note to clients performing work related to the Lead Based Paint Hazard Reduction Act: Sample results for wipes not meeting ASTM E 1792 are not recognized within the National Lead Laboratory Accreditation Program.
Forensic Analytical can not determine whether or not wipes submitted to us for analysis meet the ASTM standard. We recommend to our clients that they document the brand of wipe that they use for each submission on their sample request form.

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical Laboratories

Metals Analysis of HUD Wipes

Entek Consulting Group
Project Manager
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M155929
Date Received: 11/18/14
Date Analyzed: 11/19/14
Date Printed: 11/19/14
First Reported: 11/19/14

Job ID / Site: 14-3323, PARC Specialty Contractors, Mangan Gun Range, 2140 34th Avenue, Sacramento, CA
Date(s) Collected: 11/17/14

FALI Job ID: A31353
Total Samples Submitted: 10
Total Samples Analyzed: 10

Sample Number	Lab Number	Area ft2	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-14-3323-11WIPE	30700193	1.00	Pb	8400	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-12WIPE	30700194	1.00	Pb	8200	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-13WIPE	30700195	1.00	Pb	8800	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-14WIPE	30700196	1.00	Pb	530	ug/ft2	20	NIOSH 9100/7082
ECG-14-3323-15WIPE	30700197	1.00	Pb	6800	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-16WIPE	30700198	1.00	Pb	360	ug/ft2	20	NIOSH 9100/7082
ECG-14-3323-17WIPE	30700199	1.00	Pb	3200	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-18WIPE	30700200	1.00	Pb	3500	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-19WIPE	30700201	1.00	Pb	1200	ug/ft2	40	NIOSH 9100/7082
ECG-14-3323-20WIPE	30700202	1.00	Pb	690	ug/ft2	30	NIOSH 9100/7082

Note to clients performing work related to the Lead Based Paint Hazard Reduction Act: Sample results for wipes not meeting ASTM E 1792 are not recognized within the National Lead Laboratory Accreditation Program.
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Forensic Analytical Laboratories

Metals Analysis of HUD Wipes

Entek Consulting Group
Project Manager
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M155926
Date Received: 11/18/14
Date Analyzed: 11/19/14
Date Printed: 11/19/14
First Reported: 11/19/14

Job ID / Site: 14-3323, Mangan Gun Range, 2140 34th Avenue, Sacramento, CA
Date(s) Collected: 11/17/14

FALI Job ID: A31353
Total Samples Submitted: 10
Total Samples Analyzed: 10

Sample Number	Lab Number	Area ft2	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-14-3323-21WIPE	30700173	1.00	Pb	3600	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-22WIPE	30700174	1.00	Pb	2200	ug/ft2	80	NIOSH 9100/7082
ECG-14-3323-23WIPE	30700175	1.00	Pb	1400	ug/ft2	40	NIOSH 9100/7082
ECG-14-3323-24WIPE	30700176	1.00	Pb	680	ug/ft2	30	NIOSH 9100/7082
ECG-14-3323-25WIPE	30700177	1.00	Pb	1300	ug/ft2	40	NIOSH 9100/7082
ECG-14-3323-26WIPE	30700178	1.00	Pb	3800	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-27WIPE	30700179	1.00	Pb	160	ug/ft2	8	NIOSH 9100/7082
ECG-14-3323-28WIPE	30700180	1.00	Pb	10000	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-29WIPE	30700181	1.00	Pb	12000	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-30WIPE	30700182	1.00	Pb	2100	ug/ft2	80	NIOSH 9100/7082

Note to clients performing work related to the Lead Based Paint Hazard Reduction Act: Sample results for wipes not meeting ASTM E 1792 are not recognized within the National Lead Laboratory Accreditation Program.
Forensic Analytical can not determine whether or not wipes submitted to us for analysis meet the ASTM standard. We recommend to our clients that they document the brand of wipe that they use for each submission on their sample request form.

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical Laboratories

Metals Analysis of HUD Wipes

Entek Consulting Group
Project Manager
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M155928
Date Received: 11/18/14
Date Analyzed: 11/19/14
Date Printed: 11/19/14
First Reported: 11/19/14

Job ID / Site: 14-3323, PARC Specialty Contractors, Mangan Gun Range, 2140 34th Avenue, Sacramento, CA
Date(s) Collected: 11/17/14

FALI Job ID: A31353
Total Samples Submitted: 9
Total Samples Analyzed: 9

Sample Number	Lab Number	Area ft2	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-14-3323-31WIPE	30700184	1.00	Pb	530	ug/ft2	20	NIOSH 9100/7082
ECG-14-3323-32WIPE	30700185	1.00	Pb	3500	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-33WIPE	30700186	1.00	Pb	3400	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-34WIPE	30700187	1.00	Pb	13000	ug/ft2	400	NIOSH 9100/7082
ECG-14-3323-35WIPE	30700188	1.00	Pb	2100	ug/ft2	80	NIOSH 9100/7082
ECG-14-3323-36WIPE	30700189	1.00	Pb	4100	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-37WIPE	30700190	1.00	Pb	440	ug/ft2	20	NIOSH 9100/7082
ECG-14-3323-38WIPE	30700191	1.00	Pb	7000	ug/ft2	200	NIOSH 9100/7082
ECG-14-3323-39WIPE	30700192	1.00	Pb	19000	ug/ft2	800	NIOSH 9100/7082

Note to clients performing work related to the Lead Based Paint Hazard Reduction Act: Sample results for wipes not meeting ASTM E 1792 are not recognized within the National Lead Laboratory Accreditation Program.
Forensic Analytical can not determine whether or not wipes submitted to us for analysis meet the ASTM standard. We recommend to our clients that they document the brand of wipe that they use for each submission on their sample request form.

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

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Forensic Analytical Laboratories

Metals Analysis of HUD Wipes

Entek Consulting Group
Blake Howes
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M155994
Date Received: 11/19/14
Date Analyzed: 11/20/14
Date Printed: 11/20/14
First Reported: 11/20/14

Job ID / Site: 14-3323, PARC Specialty Contractors, Mangan Gun Range, 2140 34th Avenue, Sacramento, CA
Date(s) Collected: 11/17/14

FALI Job ID: A31353
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-14-3323-40WIPE	30700363	Pb	< 8	ug	8	NIOSH 9100/7082

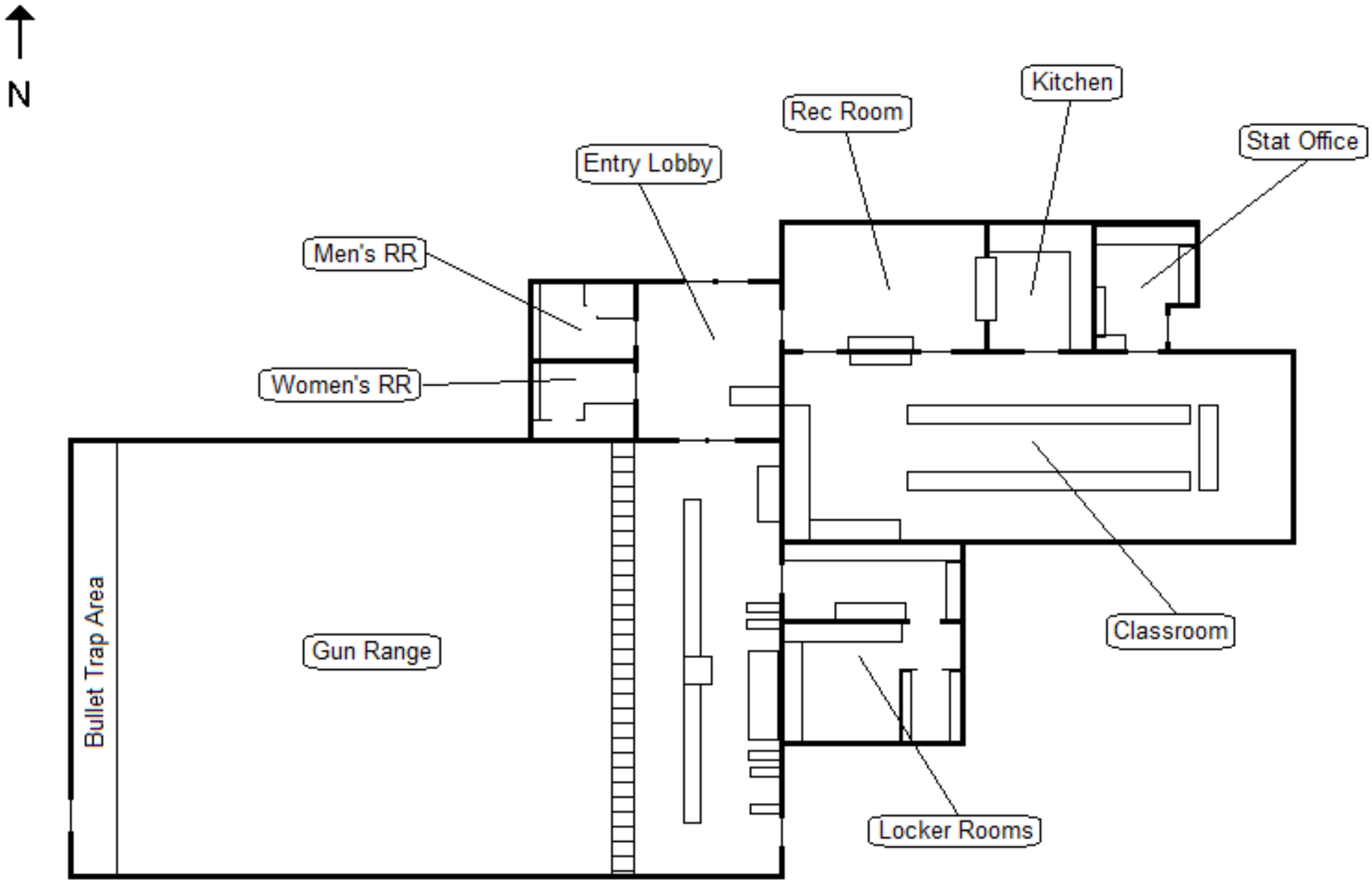
Note to clients performing work related to the Lead Based Paint Hazard Reduction Act: Sample results for wipes not meeting ASTM E 1792 are not recognized within the National Lead Laboratory Accreditation Program.
Forensic Analytical can not determine whether or not wipes submitted to us for analysis meet the ASTM standard. We recommend to our clients that they document the brand of wipe that they use for each submission on their sample request form.

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

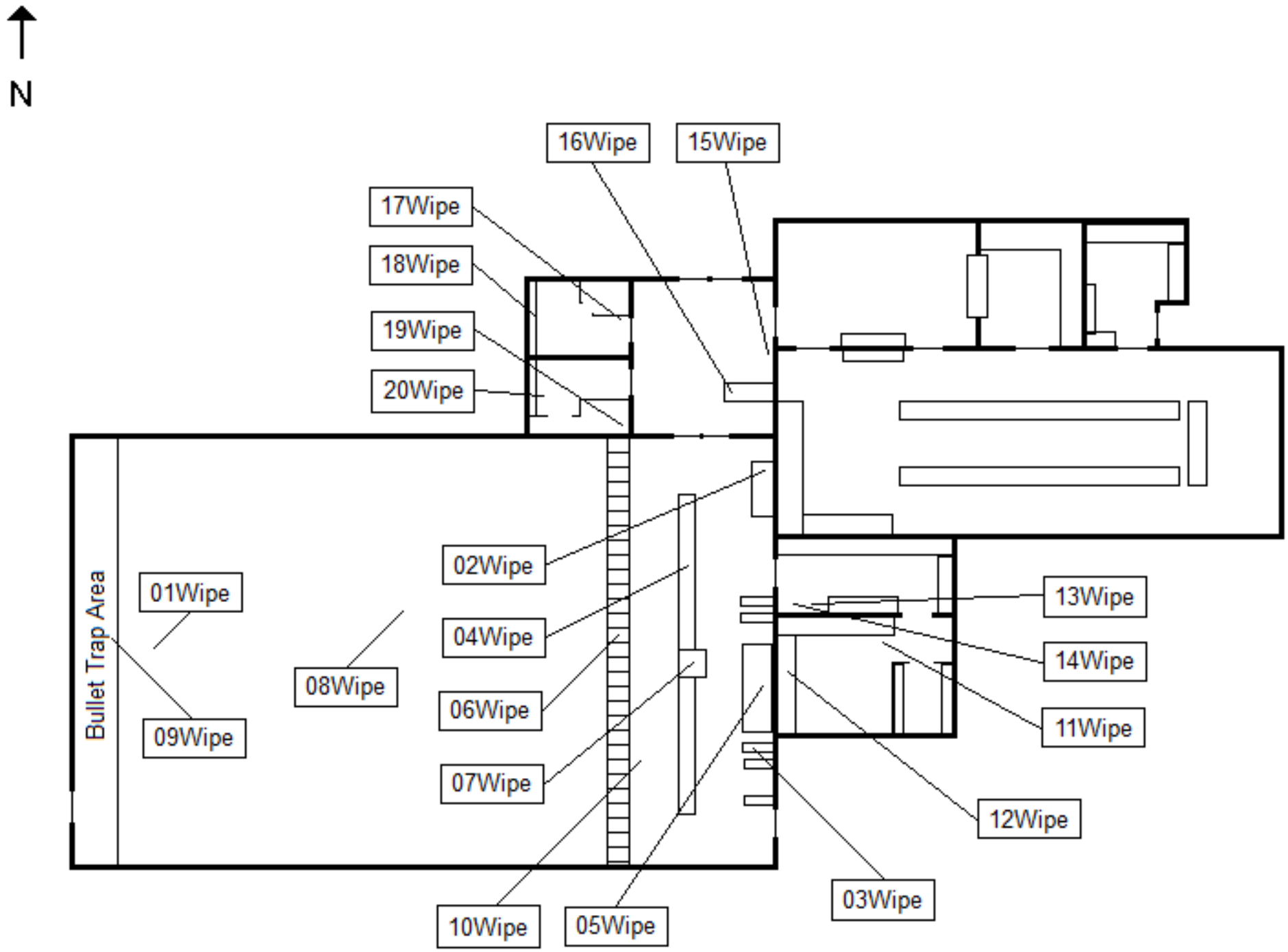
3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218



All Samples Preceeded by: ECG-14-3323-

PARC Specialty Contractors Mangan Rifle & Pistol Range 2140 34th Avenue Sacramento, CA 95822	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe Sample Location Diagram Samples Collected by: Blake Howes November 17, 2014 Project #14-3323

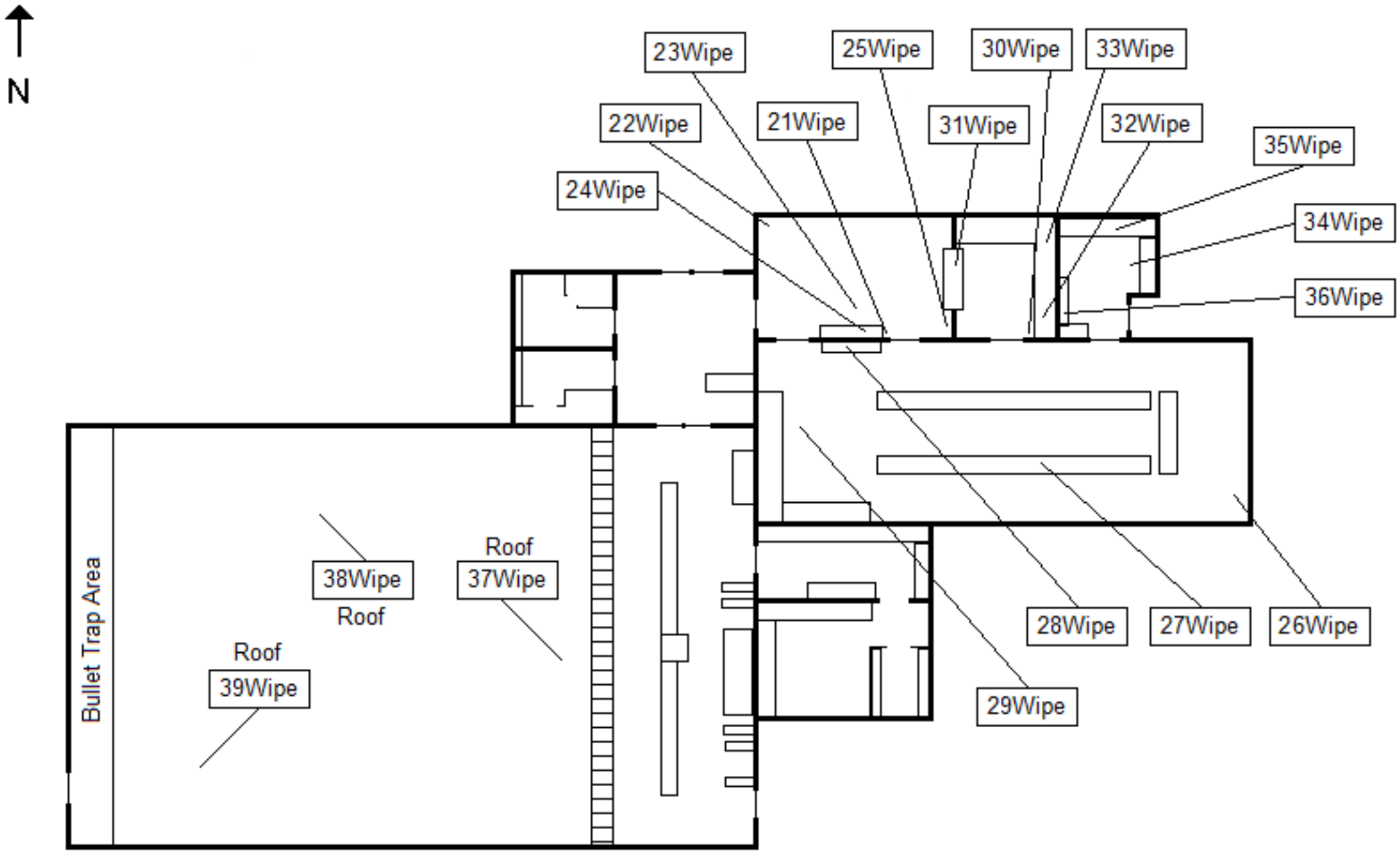
All Sample Locations Constitute a Lead Hazard as Defined by Title 17 & EPA



All Samples Preceeded by: ECG-14-3323-

PARC Specialty Contractors Mangan Rifle & Pistol Range 2140 34th Avenue Sacramento, CA 95822	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe Sample Location Diagram Samples Collected by: Blake Howes November 17, 2014 Project #14-3323

All Sample Locations EXCEPT 27Wipe Constitute a Lead Hazard as Defined by Title 17 & EPA



All Samples Preceeded by: ECG-14-3323-

PARC Specialty Contractors Mangan Rifle & Pistol Range 2140 34th Avenue Sacramento, CA 95822	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe Sample Location Diagram Samples Collected by: Blake Howes November 17, 2014 Project #14-3323

ENTEK CONSULTING GROUP, INC.

BULK MATERIAL *Analysis Request*

LEAD WIPE SAMPLING

4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Job Number: 14-3323

Client Name: PARC Specialty Contractors

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

Lab: Forensic Analytical Laboratories

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to mainoffice@entekgroup.com & Bhowes@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-01Wipe	Lead Dust Wipe - Gun Range - Floor at Bullet Trap	12" X 12"
ECG-14-3323-02Wipe	Lead Dust Wipe - Gun Range - Floor at Shooting Rests	12" X 12"
ECG-14-3323-03Wipe	Lead Dust Wipe - Gun Range - Cabinet Shelf	12" X 12"
ECG-14-3323-04Wipe	Lead Dust Wipe - Gun Range - Gun Rest Counter/Shelf	12" X 12"
ECG-14-3323-05Wipe	Lead Dust Wipe - Gun Range - Bleachers	12" X 12"
ECG-14-3323-06Wipe	Lead Dust Wipe - Gun Range - Shooting Rest Benches	12" X 12"
ECG-14-3323-07Wipe	Lead Dust Wipe - Gun Range - Control Station Shelf	12" X 12"
ECG-14-3323-08Wipe	Lead Dust Wipe - Gun Range - Bullet Shield Near Ceiling	12" X 12"
ECG-14-3323-09Wipe	Lead Dust Wipe - Gun Range - Bullet Shield at End of Range	12" X 12"
ECG-14-3323-10Wipe	Lead Dust Wipe - Gun Range - Shooting Rest Moveable Bench	12" X 12"

Delivered by: Fed Ex PO- **Date:** 11/17/14 **Time:** 3:30 PM

Received by: [signature] **Date:** 11/18/14 **Time:** 1 AM/PM

Subject: COC
To: Jim Flores <jflores@falaboratories.com>

Jim,

Find attached "Corrected Copy" of the Chain of Custody, if needed, with the CORRECT Turn Around Time of Wednesday, 11/19/14 by 5:00 pm. Project name: PARC Specialty Contractors with job #14-3323.

Also, we forgot to include one Blank Wipe (#40). I am sending it over today via Fed Ex.

I am sorry for the error.

Call Blake if any questions.

Have a Great Day!

Barbara Stevens, Project Manager Administrative Assistant

Entek Consulting Group, Inc.

4200 Rocklin Road, Suite 7

Rocklin, CA 95677

(916) 632-6800 Tele.

(916) 632-6812 Fax

bstevens@entekgroup.com

LeadWipeRqt 11-24-14CC.pdf
102K

Yesenia Garcia <ygarcia@falaboratories.com> Tue, Nov 18, 2014 at 1:00 PM
To: MaryGrace Villanueva <mgvillanueva@falaboratories.com>

Done!
[Quoted text hidden]

Forensic Analytical Laboratories, Inc.

ENTEK CONSULTING GROUP, INC.

BULK MATERIAL *Analysis Request* — *LEAD WIPE SAMPLING*

4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Job Number: 14-3323

Client Name: PARC Specialty Contractors

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

Lab: Forensic Analytical Laboratories

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to mainoffice@entekgroup.com & Bhowes@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-11Wipe	Lead Dust Wipe - Locker Room at Floor	12" X 12"
ECG-14-3323-12Wipe	Lead Dust Wipe - Locker Room at Locker/Cabinet Top	12" X 12"
ECG-14-3323-13Wipe	Lead Dust Wipe - Locker Room at Movable Shooting Mat	12" X 12"
ECG-14-3323-14Wipe	Lead Dust Wipe - Locker Room at Moveable Cardboard Target	12" X 12"
ECG-14-3323-15Wipe	Lead Dust Wipe - Main Entry Lobby at Floor	12" X 12"
ECG-14-3323-16Wipe	Lead Dust Wipe - Main Entry Lobby at Desk	12" X 12"
ECG-14-3323-17Wipe	Lead Dust Wipe - Men's Restroom at Floor	12" X 12"
ECG-14-3323-18Wipe	Lead Dust Wipe - Men's Restroom at Sill	4" X 36"
ECG-14-3323-19Wipe	Lead Dust Wipe - Women's Restroom at Floor	12" X 12"
ECG-14-3323-20Wipe	Lead Dust Wipe - Women's Restroom at Trashcan Lid	12" X 12"

Delivered by: Fed Ex PO- **Date:** 11/17/14 **Time:** 3:30 **PM**

Received by: [signature] **Date:** 11/18/14 **Time:** 1 **AM/PM**

Subject: COC
To: Jim Flores <jflores@falaboratories.com>

Jim,

Find attached "Corrected Copy" of the Chain of Custody, if needed, with the CORRECT Turn Around Time of Wednesday, **11/19/14** by 5:00 pm. Project name: PARC Specialty Contractors with job #14-3323.

Also, we forgot to include one Blank Wipe (#40). I am sending it over today via Fed Ex.

I am sorry for the error.

Call Blake if any questions.

Have a Great Day!

Barbara Stevens, Project Manager Administrative Assistant

Entek Consulting Group, Inc.

4200 Rocklin Road, Suite 7

Rocklin, CA 95677

(916) 632-6800 Tele.

(916) 632-6812 Fax

bstevens@entekgroup.com

LeadWipeRqt 11-24-14CC.pdf
102K

Yesenia Garcia <ygarcia@falaboratories.com> Tue, Nov 18, 2014 at 1:00 PM
To: MaryGrace Villanueva <mgvillanueva@falaboratories.com>

Done!
[Quoted text hidden]

Forensic Analytical Laboratories, Inc.

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BULK MATERIAL *Analysis Request*

LEAD WIPE SAMPLING

4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Lab: Forensic Analytical Laboratories

Job Number: 14-3323

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Client Name: PARC Specialty Contractors

Collected by: Blake Howes

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to mainoffice@entekgroup.com & Bhowes@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-21Wipe	Lead Dust Wipe - Rec Room at Floor	12" X 12"
ECG-14-3323-22Wipe	Lead Dust Wipe - Rec Room at Couch	12" X 12"
ECG-14-3323-23Wipe	Lead Dust Wipe - Rec Room at Chair	12" X 12"
ECG-14-3323-24Wipe	Lead Dust Wipe - Rec Room at Counter	12" X 12"
ECG-14-3323-25Wipe	Lead Dust Wipe - Rec Room at Wall with Wall Hangings	12" X 12"
ECG-14-3323-26Wipe	Lead Dust Wipe - Classroom at Floor	12" X 12"
ECG-14-3323-27Wipe	Lead Dust Wipe - Classroom at Table	12" X 12"
ECG-14-3323-28Wipe	Lead Dust Wipe - Classroom at Shelf	12" X 12"
ECG-14-3323-29Wipe	Lead Dust Wipe - Classroom at Heater	12" X 12"
ECG-14-3323-30Wipe	Lead Dust Wipe - Kitchen at Floor	12" X 12"

Delivered by: Fed Ex PO- **Date:** 11/17/14 **Time:** 3:30 PM

Received by: _____ **Date:** / / **Time:** AM/PM

ENTEK CONSULTING GROUP, INC.

4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

BULK MATERIAL *Analysis Request*

LEAD WIPE SAMPLING

Date of Sampling: November 17, 2014

Job Number: 14-3323

Client Name: PARC Specialty Contractors

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

Lab: Forensic Analytical Laboratories

Turnaround Time: Wednesday, 11/19/14 by 5:00PM

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to mainoffice@entekgroup.com & Bhowes@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-31Wipe	Lead Dust Wipe - Kitchen at Serving Area	12" X 12"
ECG-14-3323-32Wipe	Lead Dust Wipe - Kitchen at Microwave Top	12" X 12"
ECG-14-3323-33Wipe	Lead Dust Wipe - Kitchen at Pots on Shelf	12" X 12"
ECG-14-3323-34Wipe	Lead Dust Wipe - Stat Office at Floor	12" X 12"
ECG-14-3323-35Wipe	Lead Dust Wipe - Stat Office at Table	12" X 12"
ECG-14-3323-36Wipe	Lead Dust Wipe - Stat Office at Shelf	12" X 12"
ECG-14-3323-37Wipe	Lead Dust Wipe - Roof at Center Field	12" X 12"
ECG-14-3323-38Wipe	Lead Dust Wipe - Roof at Vent Exhaust	12" X 12"
ECG-14-3323-39Wipe	Lead Dust Wipe - Roof at Top of Exhaust Fan Housing	12" X 12"

Z:\Clients\PARC Specialty Contractors\14-3323 Mangan Gun Range - Indoor Firing Range - Lead\Lead Wipe\LeadWipeRqt 11-24-14CC.wpd

Delivered by: Fed Ex PO- **Date:** 11/17/14 **Time:** 3:30 PM

Received by: [signature] **Date:** 11/18/14 **Time:** 1 AM/PM

ENTEK CONSULTING GROUP, INC.

BULK MATERIAL *Analysis Request*

LEAD WIPE SAMPLING

4200 Rocklin Road, Suite 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: November 17, 2014

Lab: Forensic Analytical Laboratories

Job Number: 14-3323

Turnaround Time: Thursday, 11/20/14 by 5:00PM

Client Name: PARC Specialty Contractors

Collected by: Blake Howes

Site Address: Mangan Gun Range
2140 34th Avenue
Sacramento, CA

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to mainoffice@entekgroup.com & Bhowes@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE FEET)
ECG-14-3323-40WIPE	BLANK	N/A

Z:\Clients\PARC Specialty Contractors\14-3323 Mangan Gun Range - Indoor Firing Range - Lead\Lead Wipe\LeadWipeRqt 11-24-14 blank.wpd

Delivered by: Fed Ex PO- [illegible] **Date:** 11/18/14 **Time:** 11:30 PM

Received by: [signature] **Date:** 11-19-14 AM 1:02 RC **Time:** AM/PM

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Classroom

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Classroom

Kitchen

Kitchen

Kitchen

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Kitchen

Rec Room

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Rec Room

Main Entry

Firing Range

Firing Range

Locker Room

Locker Room

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Firing Range

Under bullet trap with spent bullets

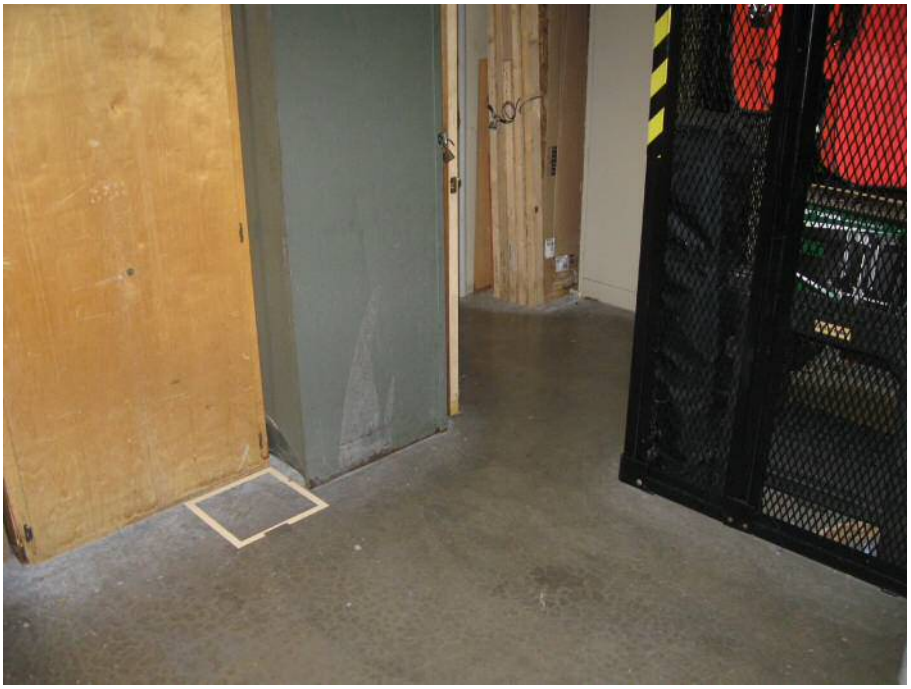
Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Firing Range - sampling one square foot of floor surface

Firing Range - sampling one square foot at shelf

Firing Range - sampling of bleacher seat

Firing Range - sampling of horizontal surface of deflection plate near the ceiling



Locker Room – sampling floor surface

Locker Room - sampling surface of shooting mats

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Main Entry - sampling surface of desk

Rec Room - sampling surface of couch

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Rec Room - sampling surface of chair

Rec Room - sampling surface of wall with items attached

Classroom - sampling table top surface

Kitchen - sampling top surface of microwave oven

Stat office - sampling floor surface

Roof - sampling surface of roof in middle of roof “field”

Mangan Rifle and Pistol Range **November 17, 2014**
2140 34th Avenue, Sacramento, CA 95822

Roof above Range - sampling top surface of exhaust fan

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

Forensic Analytical Laboratories, Inc.

3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: 101762

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: 08/01/2016
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: 08/01/2016
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: 08/01/2016
☐	**FOOD**	Accreditation Expires:
✓	**UNIQUE SCOPES**	Accreditation Expires: 08/01/2016

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Gerald R Schultz

Gerald Schultz, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 14: 03/26/2014

Date Issued: 04/30/2014

AIHA Laboratory Accreditation Programs, LLC

SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 03/01/1990

IHLAP Scope Category	Field of Testing (FoT)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte (*for internal methods only*)
Chromatography Core	Ion Chromatography (IC)		NIOSH 7903	
			OSHA ID 215 v2	
Spectrometry Core	Atomic Absorption	CVAA	NIOSH 6009	
			OSHA ID-140	
			OSHA ID-145	
		FAA	NIOSH 7082	
			OSHA ID-121	
		GFAA	NIOSH 7105	
	Inductively-Coupled Plasma	ICP/AES	NIOSH 7303	
			OSHA ID-125G	
	UV/VIS (Colorimetric)		NIOSH 7600	
Asbestos/Fiber Microscopy Core	Polarized Light Microscopy (PLM)		EPA/600/M4-82-020, 1982	
			EPA/600/R-93/116, July 1993	
	Phase Contrast Microscopy (PCM)		NIOSH 7400	
	Transmission Electron Microscopy (TEM)		EPA 600/R-93/116	SOP TEM 301
			EPA 600/R-93/116	SOP TEM 300
			EPA 600/R-93/116	SOP TEM 302
			EPA 600/R-93/116	SOP TEM 303
			EPA AHERA - 40 CFR Part 763	EPA AHERA Method (40 CFR 763, Subpart E, Appendix A, Mandatory Method
			NIOSH 7402	
			Yamate Level 1	
			Yamate Level 2	

IHLAP Scope Category	Field of Testing (FoT)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte (*for internal methods only*)
Miscellaneous Core	Gravimetric		NIOSH 0500	
			NIOSH 0600	

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA-LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air analysis is not included as part of the NLLAP.

Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 06/26/1995

Field of Testing (FoT)	Method	Method Description *(for internal methods only)*
Paint	EPA SW-846 3050B	
	EPA SW-846 7420	
Soil	EPA SW-846 3050B	
	EPA SW-846 7420	
Settled Dust by Wipe	HUD App. 14.2	IN HOUSE METHOD
	NIOSH 7082	
	NIOSH 9100	
	OSHA ID-105 Modified	
Airborne Dust	NIOSH 7082	
	NIOSH 7105	
	NIOSH 7303	

A complete listing of currently accredited Environmental Lead laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Environmental Microbiology Laboratory Accreditation Program (EMLAP)

Initial Accreditation Date: 11/01/2003

EMLAP Category	Field of Testing (FoT)	Method	Method Description *(for internal methods only)*
Fungal	Air - Culturable	SOP IAQ 100	Analysis of Viable Air Samples for Identification of Fungal Mycota
	Bulk - Culturable	SOP IAQ 103	Analysis of Viable Bulk Samples for Identification of Fungal Mycota
	Surface - Culturable	SOP IAQ 103	Analysis of Viable Bulk Samples for Identification of Fungal Mycota
	Air - Direct Examination	SOP IAQ 101	Analysis of Non-Viable Air Samples for Identification of Fungal Mycota
	Bulk - Direct Examination	SOP IAQ 102	Analysis of Non-Viable Bulk Samples for Identification of Fungal Mycota
	Surface - Direct Examination	SOP IAQ 102	Analysis of Non-Viable Bulk Samples for Identification of Fungal Mycota
Bacterial	Legionella	IAQ 214	Recovery of Legionellae from Swab Samples

A complete listing of currently accredited Environmental Microbiology laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Unique Scopes Laboratory Accreditation Program (Unique Scopes)

Initial Accreditation Date: 05/01/2014

Unique Scope Category	Field of Testing (FoT)	Method	Method Description (*for internal methods only*)
Consumer Product Testing	Lead in Paint and Other Similar Surface Coatings	16 C.F.R 1303 CPSC-CH-E1003-09	MET 213
		16 C.F.R 1303 CPSC-CH-E1001.08.1	MET 214
		16 C.F.R 1303 CPSC-CH-E1002.08.1	MET 215

A complete listing of currently accredited Food laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL LABORATORY ACCREDITATION

Is hereby granted to

Forensic Analytical Laboratories, Inc.

Hayward Laboratory

3777 Depot Road, #409

Hayward, CA 94545

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1202**

Expiration Date: **05/31/2016**

Effective Date: **06/01/2014**

Richmond, California
subject to forfeiture or revocation

David Mazzera, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

Forensic Analytical Laboratories, Inc.
Hayward Laboratory
3777 Depot Road, #409
Hayward, CA 94545
Phone: (510) 887-8828

Certificate No.: 1202
Renew Date: 5/31/2014

Field of Testing: 101 - Microbiology of Drinking Water			
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.160	001	Total Coliform (Enumeration)	SM9223
101.200	001	E. coli (Enumeration)	SM9223B
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.040	010	Lead	SM3113B
103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.160	001	Mercury	EPA 245.1
103.300	001	Asbestos	EPA 100.1
103.301	001	Asbestos	EPA 100.2
Field of Testing: 107 - Microbiology of Wastewater			
107.242	001	Enterococci	Enterolert
107.245	001	E. coli	SM9223
Field of Testing: 109 - Toxic Chemical Elements of Wastewater			
109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7

As of 4/27/2012 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.190	001	Mercury	EPA 245.1
109.370	010	Lead	SM3111B

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B
114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.130	001	Lead	EPA 7420
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.240	001	Corrosivity - pH Determination	EPA 9040B
114.241	001	Corrosivity - pH Determination	EPA 9045C

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.021	001	TCLP Inorganics	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II

Field of Testing: 121 - Bulk Asbestos Analysis of Hazardous Waste

121.010	001	Bulk Asbestos	EPA 600/M4-82-020

Field of Testing: 126 - Microbiology of Recreational Water

126.050	001	Total Coliform and E. coli	SM9223
126.080	001	Enterococci	IDEXX

LEAD HAZARD EVALUATION REPORT

Section 1 – Date of Lead Hazard Evaluation November 17, 2014

Section 2–Type of Lead Hazard Evaluation (Check one box only)

☐ Lead Inspection ■ Risk Assessment ☐ Clearance Inspection ☐ Other (specify)_____

Section 3–Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
2140 34th Avenue	Sacramento	Sacramento	95822

Construction date (year) of structure	Type of structure (check one box only)
Early 1960's	☐ Multi-unit building ☐ School or daycare ☐ Single Family Dwelling ■ Other (specify) Rifle & Pistol Range

Section 4–Owner of Structure (If business/agency, list contact person)

Name	Telephone Number
City of Sacramento Parks Department - Lori Bauder	(916) 808-1196

Address [number, street, apartment (if applicable)]	City	State	Zip Code
5730 24th Street Bldg. 12	Sacramento	California	95822

Section 5–Results of Lead Hazard Evaluation (Check all that apply)

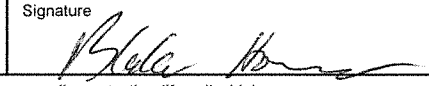
☐ No lead-based paint detected. ☐ Lead-based paint detected.

☐ No lead hazards detected. ■ Lead hazards detected.

Section 6–Individual Conducting Lead Hazard Evaluation

Name	Telephone Number
Blake Howes	(916) 632-6800

Address [number, street, apartment (if applicable)]	City	State	Zip Code
4200 Rocklin Road, Suite 7	Rocklin	CA	95677

CDPH certification number	Signature	Date
23951		11-20-14

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

N/A

Section 7–Attachments

A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;

B. Each testing method, device, and sampling procedure used;

C. All data collected, including quality control data, laboratory results, indicating laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P. Third Floor
Richmond, CA 94804-6403
FAX: (510) 622-5656

State of California Department of Public Health

Lead-Related Construction Certificate

Certificate Type: Inspector/Assessor

Expiration Date: 09/10/2015

Blake W. Howes

ID #: 23951

State of California
Division of Occupational Safety and Health

Certified Asbestos Consultant

Richard A Beall

Name

Certification No. **92-0032**

Expires on **07/07/15**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California Department of Public Health

Lead-Related Construction Certificate

Certificate Type	Expiration Date
Inspector/Assessor	04/19/2015
Project Designer	04/19/2015
Project Monitor	04/19/2015

Richard A. Beall ID #: **769**

ENTEK
CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7, Rocklin, CA 95677 Telephone (916) 632-6800 Fax (916) 632-6812 www.entekgroup.com

April 15, 2016

Mr. Karl Kurka
Environmental Program Manager
City of Sacramento, Department of Public Works
915 I Street, 2nd Floor
Sacramento, CA 95814

Re: Mangan Park & Mangan Rifle and Pistol Range, 2140 34th Avenue; Sacramento, CA 95822-3157; Report of Assessment for Lead

Dear Mr Kurka:

This report presents results of a limited lead risk assessment by Entek Consulting Group, Inc. (Entek) at the Mangan Rifle and Pistol Range located at the above address in Sacramento. You requested our assistance in assessing potential lead dust levels on various exterior building components, adjacent children's playground equipment, picnic tables, and pool area. You also requested a lead in soil assessment for near surface soil found in various locations surrounding the rifle and pistol range building and adjacent areas.

The lead assessment by Entek was limited in scope, and only included surface dust sampling of exterior building components and adjacent structures, and surface soil sampling surrounding the range building and adjacent areas to determine lead loading on various surfaces and in surface soil composition. This investigation did not include lead in paint assessment or lead-based paint inspection of painted components associated with the building or testing of water at the facility.

Lead Risk Assessment

Lead hazards or "lead-contaminated dust" is defined by the California Department of Public Health (CDPH) Title 17 as dust that "contains an amount of lead equal to, or in excess of: (a) forty micrograms per square foot (40 ug/ft²) for interior floor surfaces; or (b) two hundred and fifty micrograms per square foot (250 ug/ft^2) for interior horizontal surfaces; or (c) four hundred micrograms per square foot (400 ug/ft^2) for exterior floor and exterior horizontal surfaces". In addition, lead hazards in soil have been identified as lead equal to or in excess of 400 ppm in children's play areas, and 1,000 ppm in all other areas. The Department of Toxic Substances Control (DTSC) has various regulatory standards which may also apply.

This limited lead risk assessment was conducted on April 13, 2016 by Mr. Blake Howes, a CDPH certified Lead Inspector/Assessor to evaluate lead hazards associated with lead dust on surfaces and in surface soil composition. The lead risk assessment included collection of wipe samples of exterior building components including the roof, exterior concrete walkway, and main entry door handles. Wipe samples were also collected from nearby structures, including a picnic table, a public pool concrete deck, and children's playground equipment. Entek collected a total of seven bulk samples of dust from surfaces on or surrounding the range building. Surface wipe samples were collected using Ghost Wipe samples meeting the ASTM E 1792 materials for collection and analysis of wipe samples for lead. One blank Ghost Wipe sample was submitted for analysis in addition to the seven samples collected at the project site. A total of 11 soil samples were collected from various locations surrounding the range building, including the archery range located west of the shooting range building and the picnic area located east of the range building. Soil samples were obtained from the top one inch of surface soil in all locations.

All samples were delivered to Forensic Analytical Laboratories, Inc. (FASI) located in Hayward, CA and were analyzed by flame atomic absorption spectroscopy (AAS). FASI is certified by the State of California Department of Public Health Environmental Laboratory Accreditation Program to analyze these types of samples and is accredited by the Environmental Lead Laboratory Accreditation Program (ELLAP) administered by AIHA.

Observations

From west to east Mangan Park includes a soccer field, an archery range, the rifle and pistol range building, a picnic area, a public pool with pool house building, children's playground equipment, and additional soccer fields.

West Soccer Field:	The field is grass covered dirt with metal goal posts at either end. This field is located at the far west side of the park.
Archery Range:	Located between the firearm range building and the west soccer field, the archery range is a grass covered dirt range with static targets located on the east side. These targets consist of hay bales in front of plywood with a metal supporting structure. The targets are located in a dirt area bound by concrete.
Rifle & Pistol Range Building:	This building is a single story slab on grade structure with concrete, brick, and stucco exterior components. The roof is a multi-tiered rolled composition asphalt roof system with exhaust fans that extend from the interior of the shooting range to the exterior. The building is surrounded by grass and dirt with several concrete walkways.
Picnic Area:	This area consists of grass covered dirt with trees and multiple picnic benches located east of the range building rear access road.
Public Pool Area:	The pool area is fenced off with wrought iron and has a single story pool house building located on the north side. The olympic sized pool is surrounded by a concrete deck extending at least 10 feet on all sides.
Children's Playground Equip:	The playground area is located northeast of the public pool. The area has several play structures with bark and wood chip fill on the ground surface.
East Soccer Fields:	There are two fields with grass covered dirt and metal goal posts at both ends. These fields are located at the far east side of the park.

The roof of the Mangan Rifle and Pistol Range Building is visibly discolored at ventilation fan exhaust areas in multiple locations directly above the shooting range room. These air exhaust fans are unfiltered. The discoloration is limited to the areas covered by the exhaust fan housings. No visible discoloration is present in any of the surface soil surrounding the building, nor in any of the surface soils where samples for lead analysis were collected.

It should be noted that the Sacramento Executive Airport is located directly south of Mangan Park. This airport is in operation and services small propeller driven aircraft. Approximately six aircraft flew directly overhead during this survey, which was completed over the course of several hours.

Sampling Methods

Bulk samples were collected using Ghost Wipe sample media to collect the surface dust from each sample component. New nitrile gloves were worn for each sample and discarded after collection of each sample to minimize contamination of the samples. Where possible, one square foot of surface was sampled. A pre-cut paper template 12" x 12" in size was secured to the surface to be tested and the interior of the template opening surface area was wiped with the Ghost Wipe horizontally, and vertically, after folding inward the used portion of the Ghost Wipe. Samples were placed into a plastic centrifuge container, sealed and labeled with a unique sample identification number. All sample locations, size of the sample, and surface components sampled are included in the chain of custody forms, which are attached to this report.

Surface soil samples were collected using pre-washed plastic spoons that were disposed of after each sample was collected. New nitrile gloves were worn for each sample and discarded after collection of each sample to minimize contamination of the samples. Each sample was placed into a plastic centrifuge container, sealed and labeled with a unique sample identification number. All sample locations, including latitude and longitude, are included in the chain of custody forms, which are attached to this report.

All wipe samples were analyzed for lead by the NIOSH 9100/7082 method by FASI with results reported in micrograms per square foot (ug/ft^2). All soil samples were analyzed for lead by the EPA 3050B/7420 method by FASI with results reported in milligrams per kilogram (mg/kg). Mg/kg is equivalent to parts per million.

Table 1: List of sample results for lead by surface wipe sampling. Results expressed in micrograms per square foot (ug/ft^2).

Table 1
Lead Surface Wipe Samples

Location of Wipe Sample	Results (ug/ft^2)
Playground Equipment East of Pool House - Elevated Walkway Structure on West Side	< 8
Playground Equipment East of Pool House - Slide at South Side	< 8
Picnic Table Between Pistol & Rifle Range Building and Pool House - North Table	9
West Side of Pool Deck Between Pistol & Rifle Range Building and Pool - Approximately 6" From Ground Drain at West Side	< 8
Pistol & Rifle Range Building Roof - Upper Level Roof at Center of North Side	2,300
Door Handles of Main North Entry Door of Pistol & Rifle Range Building	2,200
Concrete Walkway Leading to Main North Entry Door of Pistol & Rifle Range Building	1,500
Blank Wipe	< 8

Table 2: List of sample results for lead by surface soil sampling. Results expressed in milligrams per kilogram (mg/kg).

Table 2
Lead Surface Soil Samples

Location of Bulk Sample	Coordinates	Results (mg/kg)
Northwest Side of Pistol & Rifle Range Building, Between 6" and 2' From Exterior Wall. Approximately 5' From Nearest Down Spout.	38°31'18.1"N 121°29'26.6"W	220
West Side of Pistol & Rifle Range Building Approximately 1' From Exterior Wall. No Down Spout Visible.	38°31'17.7"N 121°29'27.4"W	2,800
Top of Incline Approximately 20' From Southwest Corner of Pistol & Rifle Range Building.	38°31'17.2"N 121°29'27.7"W	27
Archery Range Approximately 10' East From Current Position of Soccer Field Goal Posts.	38°31'17.3"N 121°29'30.1"W	21
West Side of Pistol & Rifle Range Building at Bullet Trap Exterior Access Hatch, Approximately 2' From Exterior Wall. No Down Spout Visible.	38°31'17.4"N 121°29'27.4"W	61,000
Lead Surface Soil Sample - Southwest Side of Pistol & Rifle Range Building, Between 2' and 6" From Exterior Wall. No Down Spout Visible.	38°31'17.3"N 121°29'27.3"W	2,300
South Side of Pistol & Rifle Range Building, Approximately 3' From Exterior Wall. No Down Spout Visible.	38°31'17.3"N 121°29'26.7"W	1,100
Southeast Side of Pistol & Rifle Range Building, Approximately 3' From Exterior Wall. 5' From Nearest Down Spout.	38°31'17.5"N 121°29'26.0"W	1,700
East Side of Pistol & Rifle Range Building Near Access Road, Approximately 3' From Exterior Wall. 6' From Nearest Down Spout.	38°31'17.9"N 121°29'25.6"W	130
Picnic Table Area Approximately 35' East of Pistol & Rifle Range Building.	38°31'17.5"N 121°29'24.8"W	32
Northeast Side of Pistol & Rifle Range Building, Approximately 5' From Exterior Wall. 5' From Nearest Down Spout.	38°31'18.2"N 121°29'25.7"W	640

Please note that milligrams per kilogram and parts per million are an equivalent measurement.

Discussions and Recommendations

This lead assessment identified lead in surface dust on four of the seven wipe samples collected ranging between 9 ug/ft^2 collected at the picnic bench east of the range building to a concentration of 2,300 ug/ft^2 collected on the north side of the roof of the range building directly over the shooting range room. Lead concentrations on the concrete walkway leading to the north main entry lobby of the range building were reported at 1,500 ug/ft^2 and lead on the main entry lobby exterior door handles was reported at 2,200 ug/ft^2.

No identifiable lead above the method detection limit of 8 ug/ft^2 was found on the children's playground equipment or public pool concrete deck.

Lead content in the surface soil in the immediate surrounding area of the range building was identified from a concentration of 130 mg/kg to 61,000 mg/kg. Lead content in the surface soil approximately 20 feet west of the range building, in the archery range area, and approximately 35 feet east of the range building in the picnic area was reported at 27 mg/kg, 21 mg/kg, and 32 mg/kg, respectively.

Concentrations of lead on the rifle and pistol range building roof, exterior concrete walkway, and exterior main entry door handles exceed the CDPH criteria established in Title 17 as lead hazards, which are those as having lead dust at greater than 400 ug/ft^2 on exterior floors or exterior horizontal surfaces.

Concentrations of lead in the soil in the immediate surrounding vicinity of the rifle and pistol range building exceed the CDPH criteria established in Title 17 as lead hazards, which are those as having at or greater than 400 parts per million in children's play areas and at or greater than 1,000 ppm in all other areas. The DTSC may define lead in soil hazards at levels below the CDPH values and should be consulted if involved in cleanup activities.

CDPH criteria should be considered as a starting point to meet for clearance following remediation which may take place. The CDPH Title 17 standard is designed for a single family residence or building structure where children will be present to prevent childhood lead poisoning. Mangan Park is open to the public, including children under the age of six, therefore, the need for the clearance criteria to meet the CDPH Title 17 criteria is warranted.

Any clean-up work that will be undertaken at this facility should be performed by a contractor with CDPH certified lead Workers and certified Lead Supervisors in accordance with Title 17 requirements. Requirements in Title 17 must be followed, since a lead hazard has been identified at this building. In addition, the contractor performing any lead remediation work at this site is required to comply with the work practices, training, and personal protective practices required by Cal/OSHA in 8 CCR 1532.1 (Lead in Construction).

Attached to this report are the chain of custody (COC) forms, laboratory reports, schematics identifying sample locations, photographs of various test locations, laboratory accreditation information and certification of Entek staff.

Entek's policy is to retain a full copy of these written documents for three (3) years once the file is closed and final billed. At the end of the three (3) year period the written files will be destroyed without further notice. It is suggested copies of the file(s) are maintained per the City of Sacramento's policy.

Entek will be providing only this electronic copy of the report and its attachments for your use. However, if you would like a hard copy of this report please do not hesitate to ask. Entek will be happy to mail the report upon receipt of your request.

Please forward a copy of this report to all interested parties for review. Thank you for choosing Entek for your environmental needs. If you have any questions with this report please contact our office at (916) 632-6800.

Sincerely,

Blake Howes
Project Manager
CDPH Lead Certification #23951

Reviewed by:

Rick Beall, CIH, CSP
President
CDPH Lead Certification #769

Appendices

A. Lead Related Documents
B. Backup Documentation

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Project Letters & Reports\Final Lead Assessment Report 04-15-16.wpd

APPENDIX A

LEAD RELATED DOCUMENTS

- Lead Wipe Material Analysis Report Forms for Entek
- Lead Wipe Analysis Reports From Forensic Analytical
- Lead Wipe Material Analysis Request Forms for Entek
- Lead Soil Material Analysis Report Forms for Entek
- Lead Soil Analysis Reports From Forensic Analytical
- Lead Soil Material Analysis Request Forms for Entek
- Lead Bulk Sample Location Drawings
- Lead Hazard Evaluation Report (CDPH 8552)

ENTEK

BULK MATERIAL Analysis Report LEAD WIPE

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
PHONE (916) 632-6800
FAX (916) 632-6812
mainoffice@entekgroup.com

Date of Sampling: 4-13-16

Job Number: 16-3934

Client Name: City of Sacramento

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Lab: Forensic Analytical Laboratories

Turnaround Time: Thursday, 4-14-16 by 5:00 pm

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

SAMPLE #	RESULTS LEAD (µg/ft²)	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE INCHES)
ECG-16-3934-01Wipe	< 8	Lead Dust Wipe- Playground Equipment East of Pool House, Elevated Walkway Structure on West Side	144" - (12" X 12")
ECG-16-3934-02Wipe	< 8	Lead Dust Wipe- Playground Equipment East of Pool House, Slide at South Side	144" - (12" X 12")
ECG-16-3934-03Wipe	9	Lead Dust Wipe- Picnic Table Between Pistol & Rifle Range Building and Pool House, North Table	144" - (12" X 12")
ECG-16-3934-04Wipe	< 8	Lead Dust Wipe- West Side of Pool Deck Between Pistol & Rifle Range Building and Pool, Approximately 6" From Ground Drain at West Side	144" - (12" X 12")
ECG-16-3934-05Wipe	2,300	Lead Dust Wipe- Pistol & Rifle Range Building Roof, Upper Level Roof at Center of North Side	144" - (12" X 12")
ECG-16-3934-06Wipe	2,200	Lead Dust Wipe- Door Handles of Main North Entry Door of Pistol & Rifle Range Building	42" - (1" X 42")
ECG-16-3934-07Wipe	1,500	Lead Dust Wipe- Concrete Walkway Leading to Main North Entry Door of Pistol & Rifle Range Building	144" - (12" X 12")
ECG-16-3934-08Wipe	< 8	Lead Dust Wipe- Blank Wipe	n/a

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Lead Wipe\LeadWipeReport 04-13-16.wpd

Forensic Analytical LABORATORIES

Final Report

Metals Analysis of HUD Wipes

Entek Consulting Group
Black Howes
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M171016
Date Received: 04/14/16
Date Analyzed: 04/14/16
Date Printed: 04/14/16
First Reported: 04/14/16

Job ID / Site: 16-3934, City of Sacramento, Mangan Park Pistol & Rifle Range, 2140 34th Avenue, Sacramento, CA 95822

FALI Job ID: A31353

Date(s) Collected: 4/13/16

Total Samples Submitted: 8
Total Samples Analyzed: 8

Sample Number	Lab Number	Area ft2	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-16-3934-01WIPE	30736355	1.00	Pb	< 8	ug/ft2	8	NIOSH 9100/7082
ECG-16-3934-02WIPE	30736356	1.00	Pb	< 8	ug/ft2	8	NIOSH 9100/7082
ECG-16-3934-03WIPE	30736357	1.00	Pb	9	ug/ft2	8	NIOSH 9100/7082
ECG-16-3934-04WIPE	30736358	1.00	Pb	< 8	ug/ft2	8	NIOSH 9100/7082
ECG-16-3934-05WIPE	30736359	1.00	Pb	2300	ug/ft2	80	NIOSH 9100/7082
ECG-16-3934-06WIPE	30736360	0.29	Pb	2200	ug/ft2	90	NIOSH 9100/7082
ECG-16-3934-07WIPE	30736361	1.00	Pb	1500	ug/ft2	40	NIOSH 9100/7082
ECG-16-3934-08WIPE	30736362		Pb	< 8	ug	8	NIOSH 9100/7082

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

ENTEK

BULK MATERIAL *Analysis Request*

LEAD WIPE SAMPLING

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800 PHONE
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: 4-13-16

Lab: Forensic Analytical Laboratories

Job Number: 16-3934

Turnaround Time: Thursday, 4-14-16 by 5:00 pm

Client Name: City of Sacramento

Collected by: Blake Howes

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Analysis Conducted: Lead by Atomic Absorption Spectrometry

Special Instructions: Please email results to bhowes@entekgroup.com and mainoffice@entekgroup.com as soon as available.

SAMPLE #	MATERIAL DESCRIPTION and LOCATION	WIPE SAMPLE SIZE (SQUARE INCHES)
ECG-16-3934-01Wipe	Lead Dust Wipe- Playground Equipment East of Pool House, Elevated Walkway Structure on West Side	144 - (12"x12")
ECG-16-3934-02Wipe	Lead Dust Wipe- Playground Equipment East of Pool House, Slide at South Side	144 - (12"x12")
ECG-16-3934-03Wipe	Lead Dust Wipe- Picnic Table Between Pistol & Rifle Range Building and Pool House, North Table	144 - (12"x12")
ECG-16-3934-04Wipe	Lead Dust Wipe- West Side of Pool Deck Between Pistol & Rifle Range Building and Pool, Approximately 6" From Ground Drain at West Side	144 - (12"x12")
ECG-16-3934-05Wipe	Lead Dust Wipe- Pistol & Rifle Range Building Roof, Upper Level Roof at Center of North Side	144 - (12"x12")
ECG-16-3934-06Wipe	Lead Dust Wipe- Door Handles of Main North Entry Door of Pistol & Rifle Range Building	42 - (1"x42")
ECG-16-3934-07Wipe	Lead Dust Wipe- Concrete Walkway Leading to Main North Entry Door of Pistol & Rifle Range Building	144 - (12"x12")
ECG-16-3934-08Wipe	Lead Dust Wipe- Blank Wipe	n/a

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Lead Wipe\LeadWipeRqt 04-13-16.wpd

Delivered by: Via FedEx - Blake Howes **Date:** 4 / 13 / 16 **Time:** 3:20 **AM/PM**

Received by: [signature] **Date:** / / **Time:** **AM/PM**

RECEIVED APR 14 2016

ENTEK

BULK LEAD MATERIAL Analysis Report *LEAD SOIL SAMPLING*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800 PHONE
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: 4-13-16

Job Number: 16-3934

Client Name: City of Sacramento

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Lab: Forensic Analytical Laboratories

Turnaround Time: Thursday, 4-14-16 by 5:00 pm

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

SAMPLE #	LEAD RESULT (mg/kg)	LEAD RESULT (ppm)	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-01Soil	220		Lead Surface Soil Sample - Northwest Side of Pistol & Rifle Range Building, Between 6" and 2' From Exterior Wall. Approximately 5' From Nearest Down Spout. 38°31'18.1"N 121°29'26.6"W
ECG-16-3934-02Soil	2,800		Lead Surface Soil Sample - West Side of Pistol & Rifle Range Building Approximately 1' From Exterior Wall. No Down Spout Visible. 38°31'17.7"N 121°29'27.4"W
ECG-16-3934-03Soil	27		Lead Surface Soil Sample - Top of Incline Approximately 20' From Southwest Corner of Pistol & Rifle Range Building. 38°31'17.2"N 121°29'27.7"W
ECG-16-3934-04Soil	21		Lead Surface Soil Sample - Archery Range Approximately 10' East From Current Position of Soccer Field Goal Posts. 38°31'17.3"N 121°29'30.1"W
ECG-16-3934-05Soil	61,000		Lead Surface Soil Sample - West Side of Pistol & Rifle Range Building at Bullet Trap Exterior Access Hatch, Approximately 2' From Exterior Wall. No Down Spout Visible. 38°31'17.4"N 121°29'27.4"W
ECG-16-3934-06Soil	2,300		Lead Surface Soil Sample - Southwest Side of Pistol & Rifle Range Building, Between 2' and 6" From Exterior Wall. No Down Spout Visible. 38°31'17.3"N 121°29'27.3"W
ECG-16-3934-07Soil	1,100		Lead Surface Soil Sample - South Side of Pistol & Rifle Range Building, Approximately 3' From Exterior Wall. No Down Spout Visible. 38°31'17.3"N 121°29'26.7"W
ECG-16-3934-08Soil	1,700		Lead Surface Soil Sample - Southeast Side of Pistol & Rifle Range Building, Approximately 3' From Exterior Wall. 5' From Nearest Down Spout. 38°31'17.5"N 121°29'26.0"W

SAMPLE #	LEAD RESULT (mg/kg)	LEAD RESULT (ppm)	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-09Soil	130		Lead Surface Soil Sample - East Side of Pistol & Rifle Range Building Near Access Road, Approximately 3' From Exterior Wall. 6' From Nearest Down Spout. 38°31'17.9"N 121°29'25.6"W
ECG-16-3934-10Soil	32		Lead Surface Soil Sample - Picnic Table Area Approximately 35' East of Pistol & Rifle Range Building. 38°31'17.5"N 121°29'24.8"W
ECG-16-3934-11Soil	640		Lead Surface Soil Sample - Northeast Side of Pistol & Rifle Range Building, Approximately 5' From Exterior Wall. 5' From Nearest Down Spout. 38°31'18.2"N 121°29'25.7"W

Forensic Analytical LABORATORIES

Metals Analysis of Soils - TTLC

Entek Consulting Group
Black Howes
4200 Rocklin Road, Suite 7

Rocklin, CA 95677

Client ID: A31353
Report Number: M171018
Date Received: 04/14/16
Date Analyzed: 04/14/16
Date Printed: 04/14/16
First Reported: 04/14/16

Job ID / Site: 16-3934, City of Sacramento, Mangan Park Pistol & Rifle Range, 2140 34th Avenue, Sacramento, CA 95822
Date(s) Collected: 4/13/16

FALI Job ID: A31353
Total Samples Submitted: 11
Total Samples Analyzed: 11

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
ECG-16-3934-01SOIL	30736366	Pb	220	mg/kg	20	EPA 3050B/7420
ECG-16-3934-02SOIL	30736367	Pb	2800	mg/kg	200	EPA 3050B/7420
ECG-16-3934-03SOIL	30736368	Pb	27	mg/kg	6	EPA 3050B/7420
ECG-16-3934-04SOIL	30736369	Pb	21	mg/kg	6	EPA 3050B/7420
ECG-16-3934-05SOIL	30736370	Pb	61000	mg/kg	3000	EPA 3050B/7420
ECG-16-3934-06SOIL	30736371	Pb	2300	mg/kg	200	EPA 3050B/7420
ECG-16-3934-07SOIL	30736372	Pb	1100	mg/kg	60	EPA 3050B/7420
ECG-16-3934-08SOIL	30736373	Pb	1700	mg/kg	200	EPA 3050B/7420
ECG-16-3934-09SOIL	30736374	Pb	130	mg/kg	6	EPA 3050B/7420
ECG-16-3934-10SOIL	30736375	Pb	32	mg/kg	6	EPA 3050B/7420
ECG-16-3934-11SOIL	30736376	Pb	640	mg/kg	30	EPA 3050B/7420

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Daniele Siu

Daniele Siu, Laboratory Supervisor, Hayward Laboratory

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

ENTEK

BULK MATERIAL Analysis Request

LEAD SOIL SAMPLING

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800 PHONE
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: 4-13-16

Job Number: 16-3934

Client Name: City of Sacramento

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Lab: Forensic Analytical Laboratories

Turnaround Time: Thursday, 4-14-16 by 5:00 pm

Collected by: Blake Howes

Analysis Conducted: Lead by Atomic Absorption Spectrometry

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ECG-16-3934-08Soil	Lead Surface Soil Sample - Southeast Side of Pistol & Rifle Range Building, Approximately 3' From Exterior Wall. 5' From Nearest Down Spout. 38°31'17.5"N 121°29'26.0"W
ECG-16-3934-09Soil	Lead Surface Soil Sample - East Side of Pistol & Rifle Range Building Near Access Road, Approximately 3' From Exterior Wall. 6' From Nearest Down Spout. 38°31'17.9"N 121°29'25.6"W
ECG-16-3934-10Soil	Lead Surface Soil Sample - Picnic Table Area Approximately 35' East of Pistol & Rifle Range Building. 38°31'17.5"N 121°29'24.8"W
ECG-16-3934-11Soil	Lead Surface Soil Sample - Northeast Side of Pistol & Rifle Range Building, Approximately 5' From Exterior Wall. 5' From Nearest Down Spout. 38°31'18.2"N 121°29'25.7"W

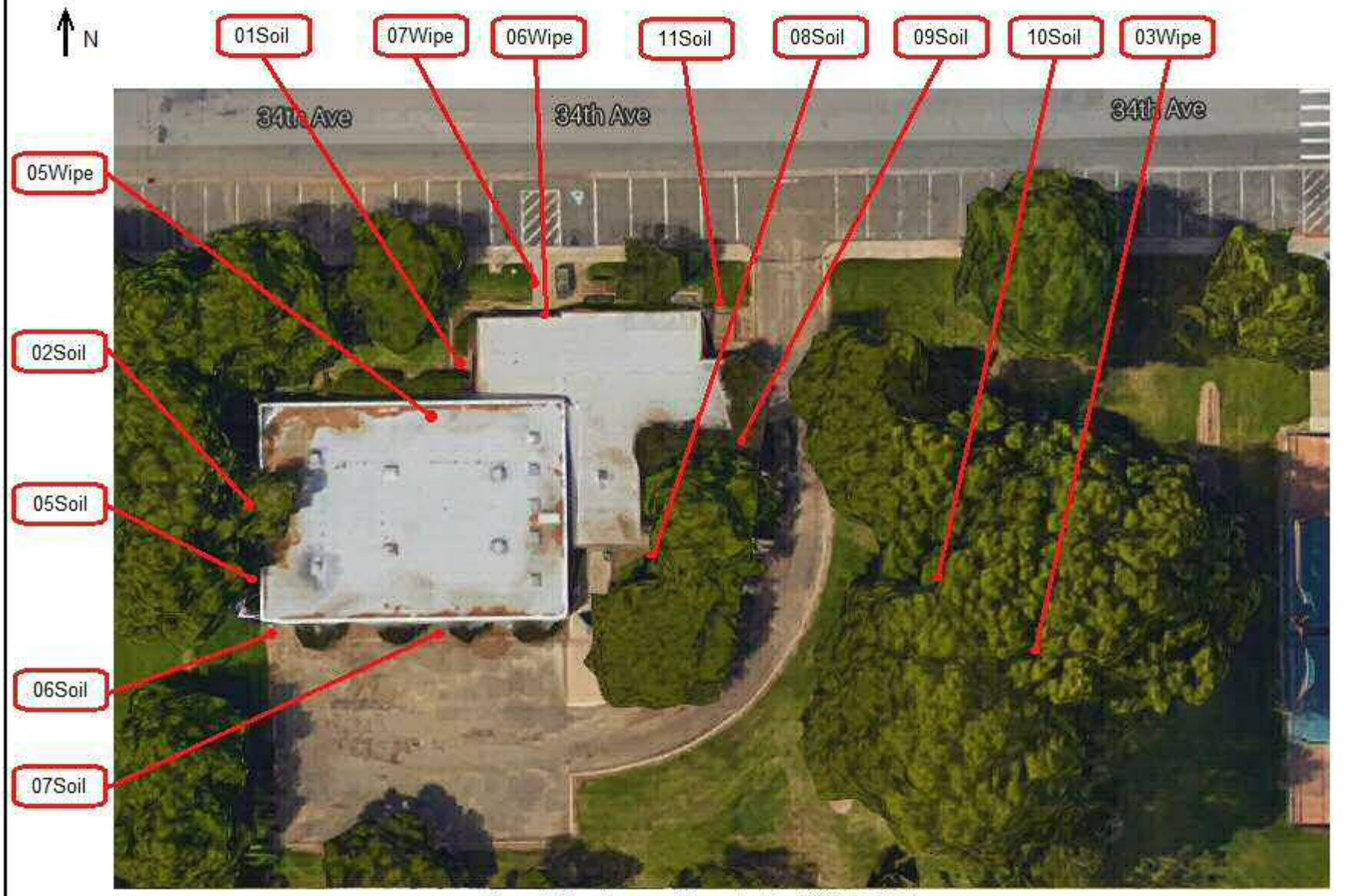
Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Soil Sample\LeadBulkRqtSoil 04-13-16.wpd

Delivered by: Via FedEx - [signature] **Date:** 4/13/16 **Time:** 3:20 **AM/PM**

Received by: _____ **Date:** / / **Time:** **AM/PM**

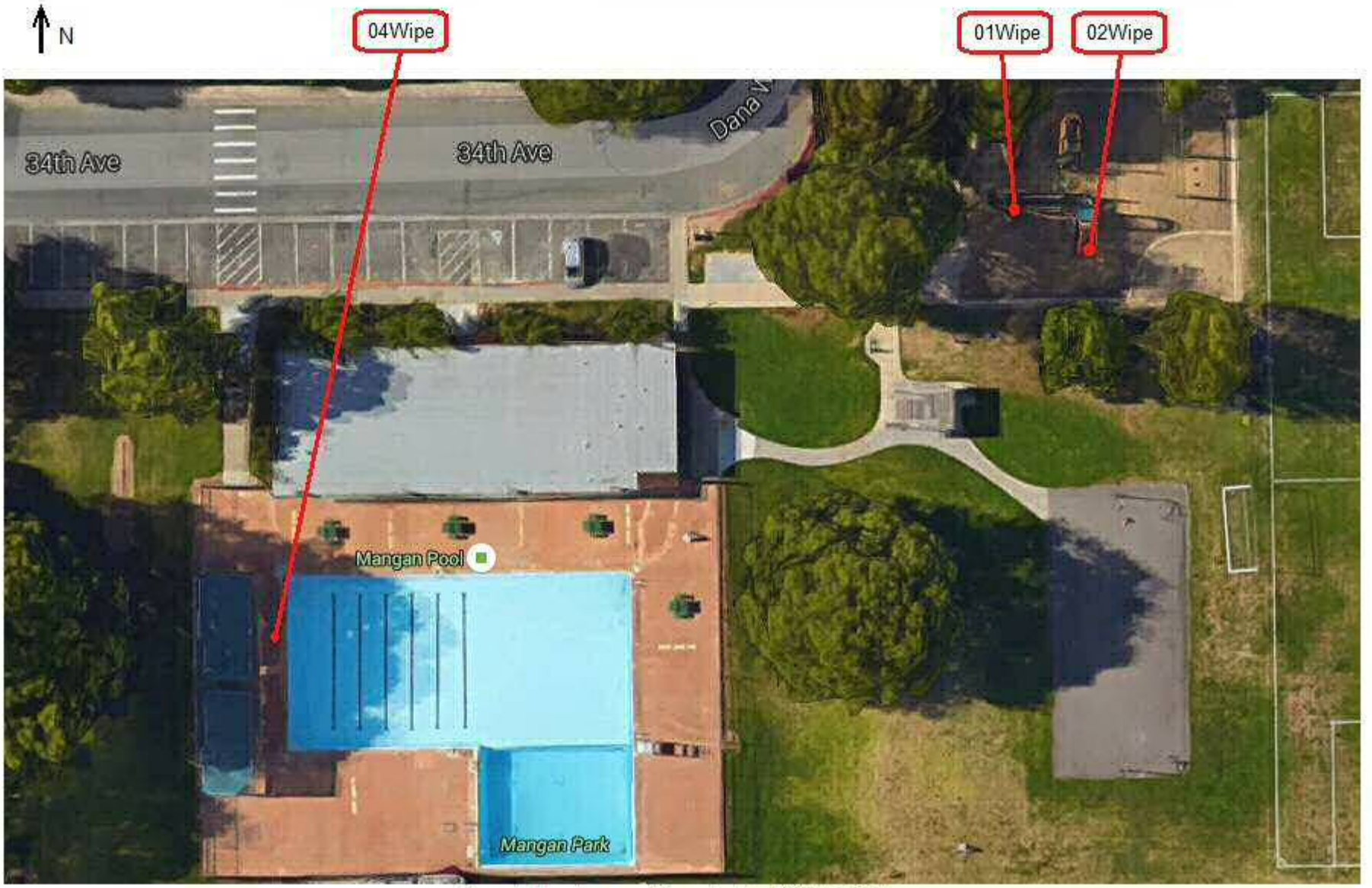
Sample Numbers are Preceded by ECG-16-3934-

City of Sacramento Mangan Park, Mangan Pistol & Rifle Range 2140 34th Avenue Sacramento, CA 95822-3157	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe & Lead Surface Soil Sample Locations Collected by: Blake Howes April 13, 2016 Project #16-3934



Sample Numbers are Preceded by ECG-16-3934-

City of Sacramento Mangan Park, Mangan Pistol & Rifle Range 2140 34th Avenue Sacramento, CA 95822-3157	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe & Lead Surface Soil Sample Locations Collected by: Blake Howes April 13, 2016 Project #16-3934



Sample Numbers are Preceded by ECG-16-3934-

City of Sacramento Mangan Park, Mangan Pistol & Rifle Range 2140 34th Avenue Sacramento, CA 95822-3157	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Wipe & Lead Surface Soil Sample Locations Collected by: Blake Howes April 13, 2016 Project #16-3934

LEAD HAZARD EVALUATION REPORT

Section 1 – Date of Lead Hazard Evaluation 4-13-16

Section 2 – Type of Lead Hazard Evaluation (Check one box only)

❒ Lead Inspection ■ Risk Assessment ❒ Clearance Inspection ❒ Other (specify)_____

Section 3–Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
2140 34TH Avenue	Sacramento	Sacramento	95822

Construction date (year) of structure	Type of structure	Children living in structure?
Late 1960's	❒ Multi-unit building ❒ School or daycare ❒ Single family dwelling ■ Other (specify) Firearm Range	❒ Yes ■ No ❒ Don't Know

Section 4–Owner of Structure (If business/agency, list contact person)

	Telephone Number
City of Sacramento, Department of Public Works, Mr. Karl Kurka	(916) 808-8430

Address [number, street, apartment (if applicable)]	City	State	Zip Code
915 I Street, 2nd Floor	Sacramento	California	95814

Section 5–Results of Lead Hazard Evaluation (Check all that apply)

❒ No lead-based paint detected ❒ Intact lead-based paint detected. ❒ Deteriorated lead-based paint detected

❒ No lead hazards detected ■ Lead-contaminated dust found ■ Lead contaminated soil found ❒ Other _____

Section 6–Individual Conducting Lead Hazard Evaluation

Name	Telephone Number
Entek Consulting Group, Inc. - Blake Howes	(916) 632-6800

Address [number, street, apartment (if applicable)]	City	State	Zip Code
4200 Rocklin Road, Suite 7	Rocklin	CA	95677

CDPH certification number	Signature	Date
23951	Blake Howes	4-15-16

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

N/A

Section 7–Attachments

A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;

B. Each testing method, device, and sampling procedure used;

C. All data collected, including quality control data, laboratory results, indicating laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

APPENDIX B

BACK UP DOCUMENTATION

- Site Photographs
- Inspector Accreditations and Certifications
- Laboratory Accreditations for Lead Analysis

Playground Structure Sample 01Wipe

Playground Structure Sample 02Wipe

Picnic Area Sample 03Wipe

Pool Area Sample 04Wipe

Range Building Roof Sample 05Wipe

Range Building Exterior Walkway Sample 07Wipe

Range Building Door Handle Sample 06Wipe

Visible Roof Discoloration at Vent

Range Building Sample 05Soil

Range Building Sample 08Soil

Range Building Sample 03Soil

Archery Range Sample 04Soil

Picnic Area Sample 10Soil


State of California Department of Public Health
Lead-Related Construction Certificate
Certificate Type
Expiration Date
Inspector/Assessor
09/10/2016
Blake W. Howes
ID #: 23951

State of California Department of Public Health

Lead-Related Construction Certificate

Certificate Type	Expiration Date
Inspector/Assessor	04/19/2016
Project Designer	04/19/2016
Project Monitor	04/19/2016

27785

Richard A. Beall ID #: **769**

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

Forensic Analytical Laboratories, Inc.

3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: 101762

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: 08/01/2016
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: 08/01/2016
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: 08/01/2016
☐	**FOOD**	Accreditation Expires:
✓	**UNIQUE SCOPES**	Accreditation Expires: 08/01/2016

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Gerald R Schultz

Gerald Schultz, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 14: 03/26/2014

Date Issued: 04/30/2014

AIHA Laboratory Accreditation Programs, LLC

SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 03/01/1990

IHLAP Scope Category	Field of Testing (FoT)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte (*for internal methods only*)
Chromatography Core	Ion Chromatography (IC)		NIOSH 7903	
			OSHA ID 215 v2	
Spectrometry Core	Atomic Absorption	CVAA	NIOSH 6009	
			OSHA ID-140	
			OSHA ID-145	
		FAA	NIOSH 7082	
			OSHA ID-121	
		GFAA	NIOSH 7105	
	Inductively-Coupled Plasma	ICP/AES	NIOSH 7303	
			OSHA ID-125G	
	UV/VIS (Colorimetric)		NIOSH 7600	
Asbestos/Fiber Microscopy Core	Polarized Light Microscopy (PLM)		EPA/600/M4-82-020, 1982	
			EPA/600/R-93/116, July 1993	
	Phase Contrast Microscopy (PCM)		NIOSH 7400	
	Transmission Electron Microscopy (TEM)		EPA 600/R-93/116	SOP TEM 301
			EPA 600/R-93/116	SOP TEM 300
			EPA 600/R-93/116	SOP TEM 302
			EPA 600/R-93/116	SOP TEM 303
			EPA AHERA - 40 CFR Part 763	EPA AHERA Method (40 CFR 763, Subpart E, Appendix A, Mandatory Method
			NIOSH 7402	
			Yamate Level 1	
			Yamate Level 2	

IHLAP Scope Category	Field of Testing (FoT)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte (*for internal methods only*)
Miscellaneous Core	Gravimetric		NIOSH 0500	
			NIOSH 0600	

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA-LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air analysis is not included as part of the NLLAP.

Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 06/26/1995

Field of Testing (FoT)	Method	Method Description *(for internal methods only)*
Paint	EPA SW-846 3050B	
	EPA SW-846 7420	
Soil	EPA SW-846 3050B	
	EPA SW-846 7420	
Settled Dust by Wipe	HUD App. 14.2	IN HOUSE METHOD
	NIOSH 7082	
	NIOSH 9100	
	OSHA ID-105 Modified	
Airborne Dust	NIOSH 7082	
	NIOSH 7105	
	NIOSH 7303	

A complete listing of currently accredited Environmental Lead laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC

SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Environmental Microbiology Laboratory Accreditation Program (EMLAP)

Initial Accreditation Date: 11/01/2003

EMLAP Category	Field of Testing (FoT)	Method	Method Description *(for internal methods only)*
Fungal	Air - Culturable	SOP IAQ 100	Analysis of Viable Air Samples for Identification of Fungal Mycota
	Bulk - Culturable	SOP IAQ 103	Analysis of Viable Bulk Samples for Identification of Fungal Mycota
	Surface - Culturable	SOP IAQ 103	Analysis of Viable Bulk Samples for Identification of Fungal Mycota
	Air - Direct Examination	SOP IAQ 101	Analysis of Non-Viable Air Samples for Identification of Fungal Mycota
	Bulk - Direct Examination	SOP IAQ 102	Analysis of Non-Viable Bulk Samples for Identification of Fungal Mycota
	Surface - Direct Examination	SOP IAQ 102	Analysis of Non-Viable Bulk Samples for Identification of Fungal Mycota
Bacterial	Legionella	IAQ 214	Recovery of Legionellae from Swab Samples

A complete listing of currently accredited Environmental Microbiology laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

Forensic Analytical Laboratories, Inc.
3777 Depot Road, Suite 409, Hayward, CA 94545

Laboratory ID: **101762**
Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Unique Scopes Laboratory Accreditation Program (Unique Scopes)

Initial Accreditation Date: 05/01/2014

Unique Scope Category	Field of Testing (FoT)	Method	Method Description (*for internal methods only*)
Consumer Product Testing	Lead in Paint and Other Similar Surface Coatings	16 C.F.R 1303 CPSC-CH-E1003-09	MET 213
		16 C.F.R 1303 CPSC-CH-E1001.08.1	MET 214
		16 C.F.R 1303 CPSC-CH-E1002.08.1	MET 215

A complete listing of currently accredited Food laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL LABORATORY ACCREDITATION

Is hereby granted to

Forensic Analytical Laboratories, Inc.

Hayward Laboratory

3777 Depot Road, #409

Hayward, CA 94545

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1202**

Expiration Date: **05/31/2016**

Effective Date: **06/01/2014**

Richmond, California
subject to forfeiture or revocation

David Mazzera, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

Forensic Analytical Laboratories, Inc.
Hayward Laboratory
3777 Depot Road, #409
Hayward, CA 94545
Phone: (510) 887-8828

Certificate No.: 1202
Renew Date: 5/31/2014

Field of Testing: 101 - Microbiology of Drinking Water			
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.160	001	Total Coliform (Enumeration)	SM9223
101.200	001	E. coli (Enumeration)	SM9223B
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.040	010	Lead	SM3113B
103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.160	001	Mercury	EPA 245.1
103.300	001	Asbestos	EPA 100.1
103.301	001	Asbestos	EPA 100.2
Field of Testing: 107 - Microbiology of Wastewater			
107.242	001	Enterococci	Enterolert
107.245	001	E. coli	SM9223
Field of Testing: 109 - Toxic Chemical Elements of Wastewater			
109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7

As of 4/27/2012 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.190	001	Mercury	EPA 245.1
109.370	010	Lead	SM3111B

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B
114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.130	001	Lead	EPA 7420
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.240	001	Corrosivity - pH Determination	EPA 9040B
114.241	001	Corrosivity - pH Determination	EPA 9045C

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.021	001	TCLP Inorganics	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II

Field of Testing: 121 - Bulk Asbestos Analysis of Hazardous Waste

121.010	001	Bulk Asbestos	EPA 600/M4-82-020

Field of Testing: 126 - Microbiology of Recreational Water

126.050	001	Total Coliform and E. coli	SM9223
126.080	001	Enterococci	IDEXX

ENTEK
CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7, Rocklin, CA 95677 Phone (916) 632-6800 Fax (916) 632-6812 www.entekgroup.com

HAZARDOUS MATERIALS SURVEY
FINAL REPORT

OWNER/CLIENT

City of Sacramento
Department of Public Works
915 I Street, 2nd Floor
Sacramento, CA 95814

CONTACT

Mr. Karl Kurka
Environmental Program Manager

SURVEY ADDRESS

Mangan Park Rifle & Pistol Range
2140 34th Avenue
Sacramento, CA 95822

BUILDING AREAS SURVEYED

Interior/Exterior
Demolition Project

PREPARED BY

Blake Howes
CAC #13-5015 & CDPH #I/A-23951
Entek Consulting Group, Inc.
4200 Rocklin Road, Suite 7
Rocklin, CA 95677

Entek Project #16-3934

June 15, 2016

ENTEK

TABLE OF CONTENTS

Executive Summary

The United States Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants (US EPA NESHAP), 40 CFR Part 61, requires an owner or operator of a demolition or renovation project to thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos-containing materials (ACM) prior to the commencement of that project.

This inspection report was requested by Mr. Karl Kurka, Environmental Program Manager with the City of Sacramento Department of Public Works.

The purpose of the inspection was to comply with US EPA NESHAP requirements and the Sacramento Metropolitan Air Quality Management District (SMAQMD) which has jurisdiction for this project site to determine if asbestos or lead containing materials are present which may be impacted during an upcoming demolition project, which will include demolition of the Mangan Park Rifle & Pistol Range building, which was originally constructed in the 1960's.

The attached drawing(s) show approximate sample locations and also identify those bulk sample materials analyzed and found to contain asbestos greater than 1% with a (+) after the sample number. Materials analyzed and found to contain less than 1% asbestos or reported as none detected have a (-) after each sample number.

Materials are classified in the tables of this report as regulated asbestos containing material (RACM), Category I (CAT-I) or Category II (CAT-II) ACM, or asbestos containing construction material (ACCM), which included collecting multiple samples of some materials. Contractors and other individuals who view the sample locations and associated results indicated with either a (-) or a (+) on the drawing to make determinations take the risk of misidentifying a material and may arrive at determinations which are in direct conflict with the written findings of this report. This use of the drawing and the information provided on it relating to individual sample results in determining if a material does or does not contain asbestos is not recommended.

This is a summary of the report. The report must be read in its entirety, and the reader must review all the detailed information provided in the body of the report prior to making any interpretations, or conclusions pertaining to the information. Any conclusions made by the reader about the information provided in the body of this report which are contradictory or not included in this report are the responsibility of the reader.

Asbestos

On June 6, 2016, Entek conducted a survey specific to areas designated by Mr. Karl Kurka, which included all interior and exterior areas of the Mangan Range Building. Laboratory analysis determined that asbestos is present in the window glazing putty that can be found on the exterior sides of building windows where present. Specifics can be found in later sections of the report.

Materials found or assumed to contain asbestos:

- Window Glazing Putty

Materials that do not contain asbestos:

- Red Brick & Gray Mortar
- Concrete Slab
- Red/Gray Concrete Floor Coating
- Acoustic Wall Panels
- 4" Ceramic Wall Tile & Grout
- Wall Concrete
- Composition Asphalt Rolled Roofing
- Roof Counter Flashing Sealant

Lead

Entek investigated existing interior and exterior paints, coatings, or glazed ceramic tiles in an effort to determine if lead is present in these materials.

All materials in the following list were found or are assumed to contain more than 5,000 parts per million (ppm) lead and are classified as lead-based paint (LBP). If more than 100 square feet of these materials are impacted by a "trigger task", prior notification to Cal/OSHA will be required.

- Brown Colored Paint on Metal Railing - Gun Range Room
- Brown Colored Paint on Wood Fascia - Exterior of Building
- 4' Ceramic Wall Tile - Men's Restroom

The paints detailed in the following list were determined to contain lead in amounts less than 5,000 ppm and are classified as lead containing paint (LCP). Any work designated by California Occupational Safety Health Administration (Cal/OSHA) as a "trigger task" which will impact these paints, coatings, or materials must be done by properly trained personnel, in compliance with all lead related Cal/OSHA regulations and requirements.

- Green Colored Paint on Concrete Walls - Gun Range Room
- Brown Colored Paint on Metal Stall Components - Gun Range Room
- White Colored Paint on Wood Roof Joists - Gun Range Room
- Varnish on Walls, Doors, and Counters - Break Room, Kitchen, Classroom
- Beige Colored Paint on Wood Roof Joists - Throughout Building
- Red Colored Floor Coating - Throughout Building
- Brown Colored Paint on Wood Door Frames - Entry Doors
- Beige Colored Paint on Concrete Walls - Exterior of Building

Introduction

This report presents results of an asbestos and lead survey performed by Entek which included all interior and exterior areas of the Mangan Park Rifle & Pistol Range located at 2140 34th Avenue in Sacramento.

I conducted this survey on June 6, 2016. I am a US EPA Asbestos Hazard Emergency Response Act (AHERA)-accredited building inspector, a Cal/OSHA Certified Asbestos Consultant (CAC), and a State of California Department of Public Health (CDPH) certified Lead Inspector/Assessor.

Building Description

The Mangan Park Rifle & Pistol Range building is a single story slab on grade structure with concrete, brick, and wood finish materials. The interior is divided up into the firing range room, which has all concrete walls, and other rooms, which include restrooms, storerooms, a kitchen, a break room, an office, and a classroom. The floor is finished concrete throughout and there are no ceiling finish materials, which is bare wood roof joists. The roof is comprised of composition asphalt rolled roofing.

Asbestos Inspection and Sample Collection Protocols

Entek included all interior and exterior areas included in this report, but did not use any demolition methods to look within enclosed wall or ceiling cavities during this investigation. Entek did include all suspect materials observed in, on, or associated with the areas included in this report.

Bulk samples were collected of various materials suspected to contain asbestos by utilizing a power drill and coring tube, cutting the materials with a razor knife, or use of other appropriate hand tools.

Miscellaneous materials were collected from each homogenous area in a manner sufficient to determine whether the material is or is not ACM as required in 40 CFR Part 763, Asbestos-Containing Materials in Schools; Final Rule and Notice, published October 30, 1987.

Approximate locations of all samples collected during this inspection are indicated on the "Bulk Asbestos Material Analysis Request Form for Entek", which served as the chain of custody for the samples, and on the building diagrams attached to this report.

Asbestos Bulk Sample Results

There were several materials observed which are considered "suspect" under US EPA guidelines. Under current US EPA guidelines for conducting building inspections for ACM, all "suspect" materials must be assumed to contain asbestos until otherwise determined by laboratory testing.

The samples of materials suspected of containing asbestos were submitted to Asbestech, a laboratory located in Carmichael, California. These samples were subsequently analyzed by polarized light microscopy (PLM) with dispersion staining. Asbestech is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for this analysis.

US EPA NESHAP uses the terms RACM, CAT-I, & CAT-II when identifying materials which contain asbestos in amounts greater than 1%. Cal/OSHA uses the term ACCM which indicates a manufactured construction material contains greater than 0.1% asbestos by weight by the PLM method. This definition can be found in 8 CCR Part 1529.

All samples found to contain <1% asbestos by PLM analysis which are not identified as containing >1% asbestos, classified as RACM, CAT-I, or CAT-II materials in the following results tables were additionally analyzed using the 400 point count (PC) method with analysis by PLM. This additional analysis is required by NESHAP and enforced by SMAQMD. The PC method analysis results were used only to verify a material did not contain >1% asbestos as a single layer material. A result reported as none detected or "trace" by the PC method only verified the initial PLM result of <1% and shall not be used to determine the identified material does not contain asbestos. Copies of Asbestech's laboratory reports and accreditations are attached.

A total of 18 bulk samples were collected of all the materials considered to be "suspect", which were observed during this investigation. Results of the analysis are listed in the following tables:

Suspect Materials Found or Known TO Contain <1% Asbestos (ACCM)				
Sample ID#'s	**Suspect Material**	**Asbestos Content/Type (%) by PLM/PC**	**Location**	**Total Estimated Quantity**
09A-C	Window Glazing Putty	<1% CHRYSOTILE	Exterior Windows Where Present	15 Sq. Ft.

NOTE: Cal/OSHA regulates all materials containing greater than 0.1% asbestos. As a result, impact to materials identified as ACCM and ACM must be performed by properly asbestos trained personnel utilizing appropriate personal protection, work practices, as well as, properly constructed and demarcated work areas or containments, in accordance with Cal/OSHA asbestos regulations.

Suspect Materials Found NOT TO Contain Asbestos or Considered Non-Suspect				
Sample ID#'s	**Suspect Material**	**EPA AHERA "Suspected" ACBM**	**Asbestos Content**	**Location**
01A-B	Red Brick, Gray Mortar	Miscellaneous	NONE DETECTED	Throughout Building
02A-B	Concrete Slab	Miscellaneous	NONE DETECTED	Throughout Building

Suspect Materials Found NOT TO Contain Asbestos or Considered Non-Suspect				
Sample ID#'s	**Suspect Material**	**EPA AHERA "Suspected" ACBM**	**Asbestos Content**	**Location**
03A-B	Gray/Red Concrete Floor Coating	Miscellaneous	NONE DETECTED	Throughout Building
04A	Acoustic Wall Panels	Miscellaneous	NONE DETECTED	Main Entry Hall
05A	4" Ceramic Tile, Grout	Miscellaneous	NONE DETECTED	Men's Restroom
06A-B	Wall Concrete	Miscellaneous	NONE DETECTED	Throughout Building
07A-B	Composition Asphalt Rolled Roofing	Miscellaneous	NONE DETECTED	Lower Tier Roof Over Entry, Break Room, Kitchen, Restrooms, Classroom, Office
08A-B	Composition Asphalt Rolled Roofing	Miscellaneous	NONE DETECTED	Upper Tier Roof Over Firing Range Room

NOTE: All sample numbers are preceded by ECG-16-3934-

US EPA AHERA uses three terms when determining the classification of a material for the purpose of sampling. These terms include miscellaneous, surfacing, and thermal system insulation (TSI).

Miscellaneous materials are building materials on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or TSI.

Surfacing materials are materials that are sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceiling and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

TSI is material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain, water condensation, or for other purposes.

The information provided in the tables of this report are for use by the Owner in determining where asbestos containing materials are located, and whether or not any future work may impact those materials. The information is also provided for use by any contractor who may perform work in areas impacting the materials listed in this report.

Any building materials which are considered "suspect" for containing asbestos which have not been identified in this report must be assumed to contain asbestos in amounts >1% until properly investigated and/or tested.

Materials commonly excluded from being suspected for containing asbestos include, but are not limited to: unwrapped pink and yellow fiberglass insulating materials or products,

foam insulation, wood, metal, plastic, rubber, or glass. All other types of building materials or coatings on the materials listed above are commonly listed as "suspect" and must be tested prior to impact. Work impacting these untested or newly discovered materials must cease until an investigation can be completed.

Asbestos Regulatory Requirements

US EPA

The property included in this survey report is located in Sacramento County. Sacramento Metropolitan Air Quality Management District (SMAQMD) has been given authority for enforcement of the NESHAP regulations in Sacramento County through the use of their own rules (Rule 902).

Ten day advance written notification to the SMAQMD is required prior to the performance of any demolition project regardless of asbestos being present or not. A demolition is the wrecking, taking out, or burning of any load supporting structural member. A renovation is everything else.

Ten day advance written notification is also required when >160 square feet of RACM will be disturbed. Since the window putty found to contain asbestos does not meet the type or quantity requirement, prior notice to SMAQMD will not be required for asbestos purposes. Advance notification would still be required in the event of a demolition activity.

Cal/OSHA

Disturbance of any ACM or ACCM could generate airborne asbestos fibers and would be regulated by Cal/OSHA. Cal/OSHA worker health and safety regulations apply during any disturbance of ACM or ACCM by a person while in the employ of another. This is true regardless of friability or quantity disturbed. This applies to materials found to contain <1% asbestos.

Although it has been estimated less than 100 square feet of ACM or ACCM does exist and will be impacted during the upcoming project, Entek recommends the use of a licensed asbestos contractor, certified by the State of California, and registered with Cal/OSHA to perform the asbestos related removal work.

For compliance with Title 8, Section 341.9, the asbestos contractor must send written notice at least one day (24 hours) prior to start of any work which will impact any amount of asbestos to the local office for the State of California, Department of Occupational Safety and Health, and perform all work in accordance with Cal/OSHA requirements.

Lead Inspection, Sampling, & Results

A total of 10 bulk samples of interior and exterior paints or coatings were collected and submitted to Asbestech laboratory. These samples were subsequently analyzed by atomic absorption spectrometry (AAS). Asbestech is accredited by the California Department of Public Health's Environmental Laboratory Accreditation Program Branch to perform this

analysis. Results are listed in the following tables:

Paints/Coatings/ Materials Determined to be Lead Based Paint (LBP)		
Paint/Coating Color or Material	**Lead Content**	**Component/Location**
Brown Colored Paint	7,900 ppm	Metal Hand Railings - Firing Range Room
Brown Colored Paint	52,000 ppm	Wood Fascia - Exterior of Building
4" Ceramic Wall Tile Glaze	Assumed >5,000 ppm	4" Ceramic Tile - Men's Restroom

Paints/Coatings/ Materials Determined to be Lead Containing Paint (LCP)		
Paint/Coating Color or Material	**Lead Content**	**Component/Location**
Green Colored Paint	3,400 ppm	Concrete Walls - Firing Range Room
Brown Colored Paint	4,800 ppm	Metal Stalls - Firing Range Room
White Colored Paint	210 ppm	Wood Roof Joists - Throughout Building Except Firing Range Room
Varnish	3,500 ppm	Wood Walls, Doors, & Counters - Break Room, Kitchen, Classroom, Office
Beige Colored Paint	2,900 ppm	Wood Roof Joists - Firing Range Room
Red Colored Coating	300 ppm	Concrete Floor - Throughout Building
Brown Colored Paint	4,100 ppm	Wood Door Frames - Entry Doors
Beige Colored Paint	230 ppm	Concrete Walls - Exterior of Building

LBP - Materials/coatings/paints meeting the definition of lead-based paint as defined by the CDPH and the US EPA, currently defined as containing lead in concentrations equal to or greater than 1.0 mg/cm^2, 5,000 parts per million (ppm), or 0.5% by weight.

LCP - Materials/coatings/paints which contain measurable amounts of lead. The disturbance of these materials/coatings/paints is regulated by Cal/OSHA.

Lead Regulatory Compliance

Any upcoming project which may result in the disturbance of lead containing products or surfaces, but is not intended to remediate a lead hazard or specifically designed to remove LBP to reduce or eliminate a known hazard, would be considered "lead related construction work".

Lead related construction work does not fit the classification of a "lead abatement project" under CDPH Title 17 regulations. "*Abatement*" is defined in 17 CCR, Division 1, Chapter 8, Article 1 as "any set of measures designed to reduce or eliminate lead hazards or LBP for public and residential buildings, but does not include containment or cleaning." A *lead*

hazard is defined in 17 CCR, Division 1, Chapter 8, Article 1 as "deteriorated LBP, lead contaminated dust, lead contaminated soil, disturbing LBP or presumed LBP without containment, or any other nuisance which may result in persistent and quantifiable lead exposure."

Lead related construction work means any "construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of any residential or public building, including preparation and cleanup, that, by using or disturbing lead-containing material or soil, may result in significant exposure of adults or children to lead". (17 CCR, Division 1, Chapter 8, Article 1).

Currently, Cal/OSHA has not established a definition for LBP, nor have they established minimum concentrations where their regulations do not apply. Cal/OSHA regulates all construction activities involving materials containing lead, including LBP. These regulations are found in 8 CCR, Part 1532.1, Lead in Construction.

Since Cal/OSHA has not established a concentration of lead in a product where their regulations do not apply, any disturbance to products containing lead come under the jurisdiction of Cal/OSHA and their regulations. Disturbance of paints/coatings or materials determined to be LBP may trigger a pre-work notification to Cal/OSHA if "trigger tasks" disturb 100 square feet or more of those paints/coatings or materials. Trigger tasks are described in 8 CCR Part 1532.1 and include: manual demolition, power tool cleaning without dust collection systems, abrasive blasting, welding, cutting, and torch burning.

Limitations

Entek inspected only the specific areas designated by Mr. Karl Kurka that will be included in the upcoming project. This survey is specific to all interior and exterior areas of the Mangan Park Rifle & Pistol Range Building. As a result, the information provided in this inspection report may not be used to extend the inspection results to areas not included in this report without additional review and sampling as necessary.

Entek did not perform any destructive sampling to look into wall or ceiling spaces. As a result, it may be possible for materials to be hidden in these areas which are not included in this report. Entek also did not employ any destructive measures on floors of interior spaces or exterior areas covered with asphalt, concrete, or dirt. If any new materials not listed as having been sampled, the new material must be assumed to contain asbestos until properly inspected and tested for asbestos content.

Entek's policy is to retain a full copy of these written documents for three (3) years once the file is closed and final billed. At the end of the three (3) year period the written files will be destroyed without further notice. It is suggested copies of the file(s) are maintained as per the policy of the City of Sacramento.

Entek will be providing only this electronic copy of the report and its attachments for your use. However, if you would like a hard copy of this report please do not hesitate to ask. Entek will be happy to mail the report upon receipt of your request.

Thank you for choosing Entek for your environmental needs. Please call me at (916) 632-6800 if you have any questions regarding this report.

Prepared by:

Blake Howes
Project Manager
Cal/OSHA CAC #13-5015
CDPH I/A Certification #23951

Appendices

A. Asbestos Related Documents
B. Lead Related Documents
C. Backup Documentation

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Project Letters & Reports\Asb & Lead Demo Report 6-6-14\Final Haz Mat Insp Rpt 6-14-16.wpd

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APPENDIX A

ASBESTOS RELATED DOCUMENTS

- Bulk Asbestos Material Analysis Report Form for Entek
- Bulk Asbestos Analysis Report From Asbestech
- Bulk Asbestos Material Analysis Request Form for Entek
- Asbestos Bulk Sample Location Drawing
- SMAQMD Asbestos Survey Form
- SMAQMD Renovation/Demolition & Survey Notification Form

ENTEK

BULK ASBESTOS MATERIAL *Analysis Report*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Job Number: 16-3934

Client Name: City of Sacramento

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Lab: Asbestech

Turnaround Time: Wednesday, June 8, 2016

Collected by: Blake Howes

ANALYSIS REQUESTED: Asbestos by PLM with Dispersion Staining

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-01A	NONE DETECTED	Brick and Mortar; Classroom, North Wall
ECG-16-3934-01B	NONE DETECTED	Brick and Mortar; Entrance, West Wall
ECG-16-3934-02A	NONE DETECTED	Concrete Slab; Middle of Classroom
ECG-16-3934-02B	NONE DETECTED	Concrete Slab; East Side of Range
ECG-16-3934-03A	NONE DETECTED	Concrete Floor Coating; Middle of Classroom
ECG-16-3934-03B	NONE DETECTED	Concrete Floor Coating; East Side of Range
ECG-16-3934-04A	NONE DETECTED	Acoustical Wall Panels; North Wall of Entrance
ECG-16-3934-05A	NONE DETECTED	4" Ceramic Wall Tile & Grout; Men's Restroom
ECG-16-3934-06A	NONE DETECTED	Wall Concrete; North Side of Range
ECG-16-3934-06B	NONE DETECTED	Wall Concrete; South Side of Range
ECG-16-3934-07A	NONE DETECTED	Lower Roof; North Side
ECG-16-3934-07B	NONE DETECTED	Lower Roof; South Side

ENTEK

BULK ASBESTOS MATERIAL *Analysis Report*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Job Number: 16-3934

Client Name: City of Sacramento

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

Lab: Asbestech

Turnaround Time: Wednesday, June 8, 2016

Collected by: Blake Howes

ANALYSIS REQUESTED: Asbestos by PLM with Dispersion Staining

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-08A	NONE DETECTED	Upper Roof; North Side
ECG-16-3934-08B	NONE DETECTED	Upper Roof; South Side
ECG-16-3934-09A	NONE DETECTED	Window Putty; South Side of Classroom Building, Exterior
ECG-16-3934-09B	NONE DETECTED	Window Putty; South Side of Classroom Building, Exterior
ECG-16-3934-09C	**<1% CHRYSOTILE** *Confirmed by 400 Point Count Analysis*	Window Putty; West Side of Entrance, Exterior
ECG-16-3934-10A	NONE DETECTED	Roof Counter Flashing Sealant; Wall to Upper Roof South End of Building

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Bulk Sample Asb\Bulk Report 06-06-16.wpd

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, California 95608
Tel.(916) 481-8902 Fax (916) 481-3975

Client:
Entek Consulting Group, Inc.
4200 Rocklin Rd., Suite 7
Rocklin, CA 95677

Job:
16-3934 City of Sacramento
Mangan Park Pistol & Rifle Range
Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 63048-1
Date/Time Collected: 6/6/16
Date Received: 6/6/16

NVLAP Lab Code 101442-0
CDPH # 1153
Date Analyzed: 6/7/16

Sample No.	*Color/Description*	*% Type Asbestos*	*Other Materials*
ECG-16-3934-01A	Red brick, classroom north wall	NONE DETECTED	Granular Mins.
	Gray mortar	NONE DETECTED	Granular Mins.
01B	Red brick, entrance west wall	NONE DETECTED	Granular Mins.
	Gray mortar	NONE DETECTED	Granular Mins.
02A	Gray concrete slab, middle of classroom	NONE DETECTED	Granular Mins.
02B	Gray concrete slab, east side of range	NONE DETECTED	Granular Mins.
03A	Gray concrete floor coating, middle of classroom	NONE DETECTED	Granular Mins.
03B	Gray concrete floor coating, east side of range	NONE DETECTED	Granular Mins.
04A	Gray/ white acoustic wall panels, north wall of entrance	NONE DETECTED	Cellulose Pumice
05A	White 4" ceramic wall tile, men's restroom	NONE DETECTED	Calcite
	White grout	NONE DETECTED n	Calcite

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISO THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A),THE MCL IS 1 %. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.

NVLAP LAB CODE 101442-0 LAB DIRECTOR: TOM CONLON ANALYST: JIM JUNGLES

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, California 95608
Tel.(916) 481-8902 Fax (916) 481-3975

Client:
Entek Consulting Group, Inc.
4200 Rocklin Rd., Suite 7
Rocklin, CA 95677

Job:
16-3934 City of Sacramento
Mangan Park Pistol & Rifle Range
Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 63048-2
Date/Time Collected: 6/6/16
Date Received: 6/6/16

NVLAP Lab Code 101442-0
CDPH # 1153
Date Analyzed: 6/7/16

Sample No.	*Color/Description*	*% Type Asbestos*	*Other Materials*
ECG-16-3934-06A	Gray wall concrete, north side of range	NONE DETECTED	Granular Mins.
06B	Gray wall concrete, south side of range	NONE DETECTED	Granular Mins.
07A	Black lower roof, north side	NONE DETECTED	Tar Binder Fibrous Glass
07B	Black lower roof, south side	NONE DETECTED	Tar Binder Fibrous Glass
08A	Black upper roof, north side	NONE DETECTED	Tar Binder Fibrous Glass
08B	Black upper roof, south side	NONE DETECTED	Tar Binder Fibrous Glass
	Gray roofing	NONE DETECTED	Cellulose Pumice
09A	Gray window putty, south side of classroom bldg. exterior	NONE DETECTED	Calcite
09B	Gray window putty, south side of classroom bldg. exterior	NONE DETECTED	Calcite

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISO THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A),THE MCL IS 1 %. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.

NVLAP LAB CODE 101442-0 LAB DIRECTOR: TOM CONLON ANALYST: JIM JUNGLES

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, California 95608
Tel.(916) 481-8902 Fax (916) 481-3975

Client:
Entek Consulting Group, Inc.
4200 Rocklin Rd., Suite 7
Rocklin, CA 95677

Job:
16-3934 City of Sacramento
Mangan Park Pistol & Rifle Range
Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 63048-3
Date/Time Collected: 6/6/16
Date Received: 6/6/16

NVLAP Lab Code 101442-0
CDPH # 1153
Date Analyzed: 6/7/16

Sample No.	*Color/Description*	*% Type Asbestos*	*Other Materials*
ECG-16-3934-09C	Gray window putty, west side of entrance exterior	<1 CHRYSOTILE	Calcite
10A	Black roof counter flashing sealant, wall to upper roof south end of bldg.	NONE DETECTED	Opaques Polyethylene

NVLAP LAB CODE 101442-0 LAB DIRECTOR: TOM CONLON ANALYST: JIM JUNGLES Jim Jungles

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, California 95608
Tel.(916) 481-8902 Fax (916) 481-3975

Client:
Entek Consulting Group, Inc.
4200 Rocklin Rd., Suite 7
Rocklin, CA 95677

Job:
16-3934 City of Sacramento
Mangan Park Pistol & Rifle Range
Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 63062
Date/Time Collected: 6/6/16
Date Received: 6/6/16

NVLAP Lab Code 101442-0
CDPH # 1153
Date Analyzed: 6/14/16

Sample No.	*Color/Description*	*% Type Asbestos*	*Other Materials*
ECG-16-3934-09C	Gray window putty, west side of entrance exterior	NONE DETECTED	Calcite

NOTE: This sample was analyzed by quantitative Point Counting using a Chalkley Point Array over 400 non-empty points.

ENTEK

630488

BULK ASBESTOS MATERIAL *Analysis Request Form for*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Lab: Asbestech

Job Number: 16-3934

Turnaround Time: Wednesday, June 8, 2016

Client Name: City of Sacramento

Collected by: Blake Howes

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

ANALYSIS REQUESTED: Asbestos by PLM with Dispersion Staining

Special Instruction:
Stop Analysis upon first positive result (>1%) for sample in a series. Also stop analysis upon first positive result (>1%) in the joint compound for sample series.

Please e-mail results as soon as available and include copy of submittal with those results.

SAMPLE #	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-01A	Brick and Mortar; Classroom, North Wall
ECG-16-3934-01B	Brick and Mortar; Entrance, West Wall
ECG-16-3934-02A	Concrete Slab; Middle of Classroom
ECG-16-3934-02B	Concrete Slab; East Side of Range
ECG-16-3934-03A	Concrete Floor Coating; Middle of Classroom
ECG-16-3934-03B	Concrete Floor Coating; East Side of Range
ECG-16-3934-04A	Acoustical Wall Panels; North Wall of Entrance
ECG-16-3934-05A	4" Ceramic Wall Tile & Grout; Men's Restroom
ECG-16-3934-06A	Wall Concrete; North Side of Range
ECG-16-3934-06B	Wall Concrete; South Side of Range

Delivered by: Melissa Tracey **Date:** 06/06/16 **Time:** 1531 **AM/PM**

Received by: **Date:** 6/6/16 **Time:** 1934 **AM/PM**

63048

ENTEK

BULK ASBESTOS MATERIAL *Analysis Request Form for*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Lab: Asbestech

Job Number: 16-3934

Turnaround Time: Wednesday, June 8, 2016

Client Name: City of Sacramento

Collected by: Blake Howes

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

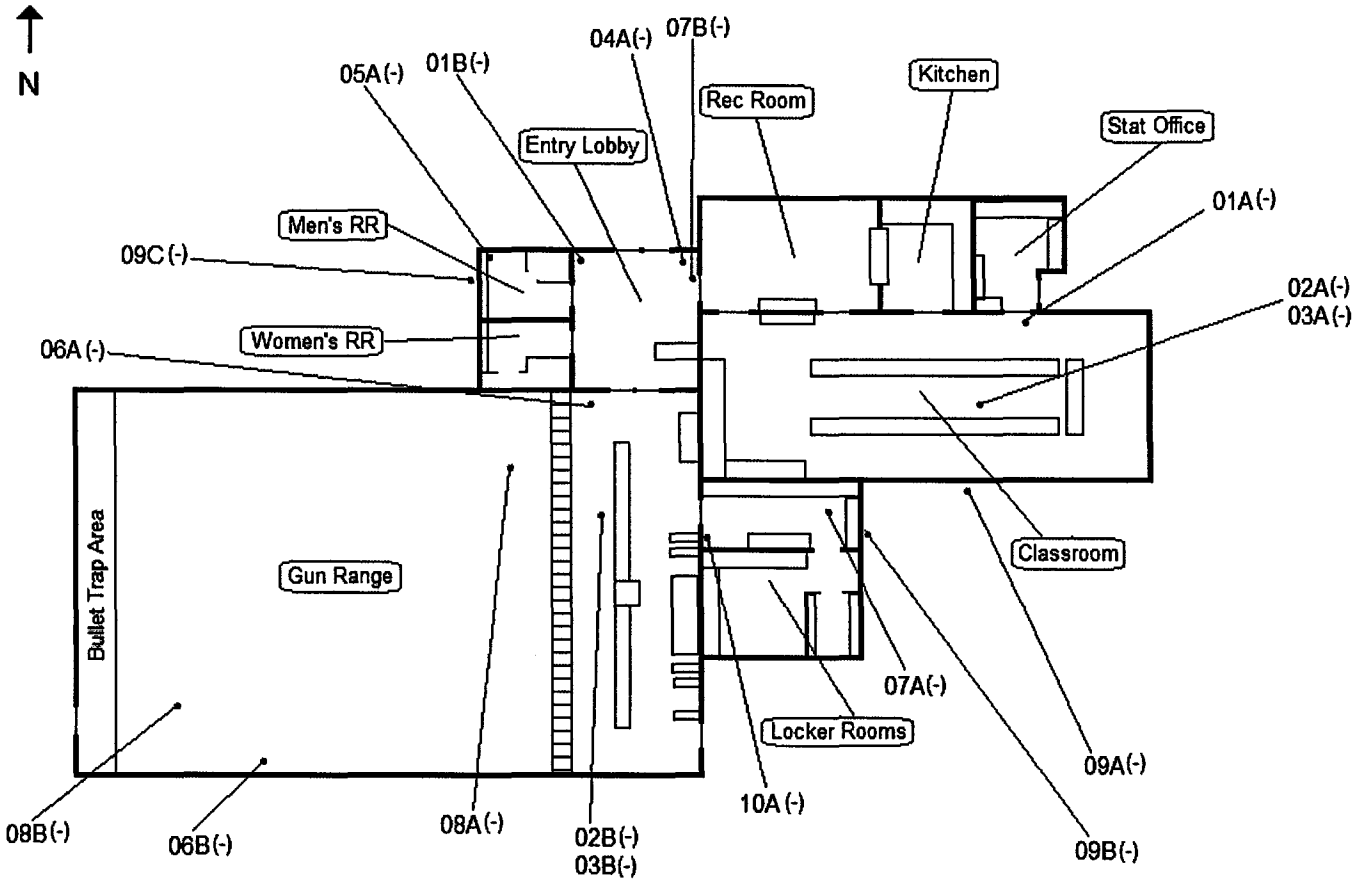
ANALYSIS REQUESTED: Asbestos by PLM with Dispersion Staining

Special Instruction:
Stop Analysis upon first positive result (>1%) for sample in a series. Also stop analysis upon first positive result (>1%) in the joint compound for sample series.

Please e-mail results as soon as available and include copy of submittal with those results.

SAMPLE #	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-07A	Lower Roof; North Side
ECG-16-3934-07B	Lower Roof; South Side
ECG-16-3934-08A	Upper Roof; North Side
ECG-16-3934-08B	Upper Roof; South Side
ECG-16-3934-09A	Window Putty; South Side of Classroom Building, Exterior
ECG-16-3934-09B	Window Putty; South Side of Classroom Building, Exterior
ECG-16-3934-09C	Window Putty; West Side of Entrance, Exterior
ECG-16-3934-10A	Roof Counter Flashing Sealant; Wall to Upper Roof South End of Building

Delivered by: Melissa Tracey **Date:** 06/06/16 **Time:** 1539



All Samples Preceeded by: ECG- 16-3934

City of Sacramento Mangan Rifle & Pistol Range 2140 34th Avenue Sacramento, CA 95822	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Asbestos Bulk Sample Locations Collected by Blake Howes on June 6, 2016 Project Number 16-3934

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Asbestos Survey Form

(See Instructions)

777 12th Street, 3rd Floor
Sacramento, CA 95814
Office (916) 874-4800
Fax (916) 874-4899
Email: asbestos@airquaility.org

1. Purpose of Survey		Renovation	x	Demolition

2. Facility Information

Project Area(s) Description		
Mangan Park Rifle & Pistol Range		
Address: 2140 34th Avenue	City: Sacramento	# of Structures: 1

3. Owner Information

Name: City of Sacramento, Dept. Of Public Works		
Address: 915 I Street, 2nd Floor	City/State: Sacramento, California	Zip: 95814

Contact: Mr. Karl Kurka	Phone: 916-808-8430	Fax:	Email: kkurka@cityofsacramento.org

4. Consultant Information — **Survey Date(s): June 6, 2016**

Company Name: Entek Consulting Group, Inc.			
Name: Blake Howes			DOSH #: 13-5015
Address: 4200 Rocklin Road, Suite 7	City/State: Rocklin, California		Zip: 95677
Phone: (916) 632-6800	Fax: (916) 623-6812	Email: bhowes@entekgroup.com	Signature: Blake Howes

5. Client Information (If different than owner) ☐ General Contractor ☐ Insurance Company ☐ Architect ☐ Property Manager ☐ Other _____

Name			
Address	City/State		Zip
Contact	Phone	Fax	Email

6. Have all of the suspect materials that will be disturbed been sampled?	☐ Yes ☐ No
If no, explain why:	

7. Summary of Total Asbestos Containing Material (ACM) Findings

Regulated Asbestos Containing Material (RACM) (Includes materials subject to known mechanical removal and fire damaged materials)			Category II		Category I	
Square Ft.	Linear Ft.	Cubic Ft.	Square Ft.	Linear Ft.	Square Ft.	Linear Ft.
0	0	0	0	0	0	0

To receive future SMAQMD Rule updates and changes affecting your industry (check one box):

☐ Please send e-mail notices to	☐ I will sign up myself at www.airquality.org/listserve/ to receive emailed notices.
■ I am already subscribed.	☐ I want the District to mail notices to the address on this application: ☐ Owner ☐ Consultant

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Asbestos Renovation/Demolition Notification Form

777 12th Street, 3rd Floor
Sacramento, CA 95814
Office (916) 874-4800
Fax (916) 874-4899
Asbestos@airquality.org

1	☐ Renovation (Do not complete items 5 or 6) ☐ Demolition (Complete all sections)	☐ Ordered Demolition (Complete all sections) ☐ Emergency Demolition (Complete all sections)

2	Contractor	Owner
	Address	Address
	City State/ Zip	City State/ Zip
	Email	Email
	Telephone	Telephone

3	Structure Name	Renovation Area	# of Floors
	Address	City/ Zip	Year Built

4	**Preference for return of form**	☐ **E-mail (see Instructions)** _____	**US Mail :** ☐ **Contractor** ☐ **Owner**	☐ **Pick up (after two working days)**

SECTIONS 5&6 - DEMOLITIONS ONLY-NOTE: Start date must be at least 10 working days from the day of your postmark or hand delivery of this form to SMAQMD

5	Start Date: ____/____/____	Completion Date: ____/____/____	Emergency Demo #

6	Revision # 1 2 3 4 5 6 7 8 9 (circle)	
	Old Start Date ____/____/____	New Start Date ____/____/____
	Old Completion Date ____/____/____	New Completion Date ____/____/____
	Method of Demo:	
	Procedure to be followed if RACM is found or Category II material becomes friable:	

SECTION 7 – Attach completed Asbestos Survey Form and Consultant's report or have DOSH Consultant complete section 7

7	Company Name Entek Consulting Group, Inc.		Telephone 916-632-6800	
	Surveyor's Name Blake Howes		DOSH # 13-5015	
	Analytical Procedure PLM with Dispersion Staining		Survey Date June 6, 2016	
	Amount of RACM	Square Feet 0	Linear Feet 0	Cubic Feet 0
	Amount of Category I 0		Amount of Category II 0	
	Project Address 2140 34th Avenue		City Sacramento	Zip 95822
	Suspect Materials Present? ■ Yes ☐ No		Consultant's Signature	

I have read and understand the directions. The information on this form is true and accurate.

8	I certify that the asbestos survey conducted on _____ (date) represents the facility as built. _____(initial)		
	Applicant Name (Print)	☐ Owner ☐ Rep / Agent ☐ Contractor	**Permit shall not be issued prior to:**
	Phone Number		
	Applicant's Signature	Date	

SMAQMD USE ONLY:

Project # _____ **Received Date/ Postmark** _____ **Date Form Returned** _____ **Initial** _____
Check # _____ **Receipt #** _____ **Amount Paid** _____ **Staff** _____ **Date Approved** _____

Rev 5/15

ENTEK

APPENDIX B

LEAD RELATED DOCUMENTS

- Bulk Lead Material Analysis Report Forms for Entek
- Lead in Paint Samples Analysis Reports From Asbestech
- Bulk Lead Material Analysis Request Forms for Entek
- Lead Bulk Sample Location Drawing
- Lead Hazard Evaluation Report (CDPH 8552)

ENTEK

BULK LEAD MATERIAL *Analysis Report Form for*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Lab: Asbestech

Job Number: 16-3934

Turnaround Time: Wednesday, June 8, 2016

Client Name: City of Sacramento

Collected by: Blake Howes

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

ANALYSIS REQUESTED: Lead by Atomic Absorption Spectrometry

SAMPLE #	LEAD RESULT (PPM)	RESULT IN WT%	MATERIAL DESCRIPTION/LOCATION
ECG-16-3934-01Pb	3,400	0.34	Green Wall Paint on Concrete; Range
ECG-16-3934-02Pb	7,900	0.79	Brown Railing Paint on Metal; Range
ECG-16-3934-03Pb	4,800	0.48	Brown Stall Paint on Metal; Range
ECG-16-3934-04Pb	210	0.021	White Roof Joist Paint on Wood; Break Room
ECG-16-3934-05Pb	3,500	0.35	Varnish on Wood; Classroom
ECG-16-3934-06Pb	2,900	0.29	Beige Roof Joist Paint on Wood; Range
ECG-16-3934-07Pb	300	0.030	Red Floor Coating; Classroom
ECG-16-3934-08Pb	4,100	0.41	Exterior Brown Door Frame Paint on Wood; Entrance to Classroom
ECG-16-3934-09Pb	52,000	5.2	Exterior Brown Fascia Paint on Wood; Entrance to Classroom
ECG-16-3934-10Pb	230	0.023	Exterior Beige Wall Paint on Concrete; Range

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, California 95608
Tel (916) 481-8902
Fax (916) 481-3975

FLAME ATOMIC ABSORPTION SPECTROMETRY
LEAD (Pb) IN PAINT SAMPLES
METHOD SW846-3050B-7420

CLIENT:
Entek Consulting Group, Inc.
4200 Rocklin Rd., Suite 7
Rocklin, CA 95677

CDPH ELAP#1153
ELPAT#101801

JOB I.D.: 16-3934, City of Sacramento,
Mangan Park Pistol & Rifle Range,
Sacramento, Ca

DATE RECEIVED: 6/6/16

DATE ANALYZED: 6/8/16

LAB JOB NO: 10763

DATE REPORTED: 6/8/16

SAMPLE DATE	SAMPLE NUMBER	DESCRIPTION	PPM	RESULT IN WT%	RL	Q.C. BATCH
6/6/16	ECG-16-3934-01Pb	Green wall paint on concrete, range	3400	0.34	0.0050%	79
6/6/16	ECG-16-3934-02Pb	Brown railing paint on metal, range	7900	0.79	0.0050%	79
6/6/16	ECG-16-3934-03Pb	Brown stall paint on metal, range	4800	0.48	0.0050%	79
6/6/16	ECG-16-3934-04Pb	White roof joist paint on wood, break room	210	0.021	0.0050%	79
6/6/16	ECG-16-3934-05Pb	Varnish on wood, classroom	3500	0.35	0.0050%	79
6/6/16	ECG-16-3934-06Pb	Beige roof joist paint on wood, range	2900	0.29	0.0050%	79
6/6/16	ECG-16-3934-07Pb	Red floor coating, classroom	300	0.030	0.0050%	79
6/6/16	ECG-16-3934-08Pb	Exterior brown door frame paint on wood, entrance to classroom	4100	0.41	0.0050%	79
6/6/16	ECG-16-3934-09Pb	Exterior brown fascia paint on wood, entrance to classroom	52000	5.2	0.0050%	79
6/6/16	ECG-16-3934-10Pb	Exterior beige wall paint on concrete, range	230	0.023	0.0050%	79

LABORATORY DIRECTOR: TOM CONLON

ANALYST: JIM JUNGLES

10763

ENTEK

BULK LEAD MATERIAL *Analysis Request Form for*

ENTEK CONSULTING GROUP, INC.
4200 ROCKLIN ROAD, SUITE 7
ROCKLIN, CA 95677
(916) 632-6800
(916) 632-6812 FAX
mainoffice@entekgroup.com

Date of Sampling: June 6, 2016

Lab: Asbestech

Job Number: 16-3934

Turnaround Time: Wednesday, June 8, 2016

Client Name: City of Sacramento

Collected by: Blake Howes

Site Address: Mangan Park Pistol & Rifle Range
2140 34th Avenue
Sacramento, CA 95822

ANALYSIS REQUESTED: Lead by Atomic Absorption Spectrometry

Special Instruction: *Please report result in PPM and % by weight. Please email results as soon as possible.*

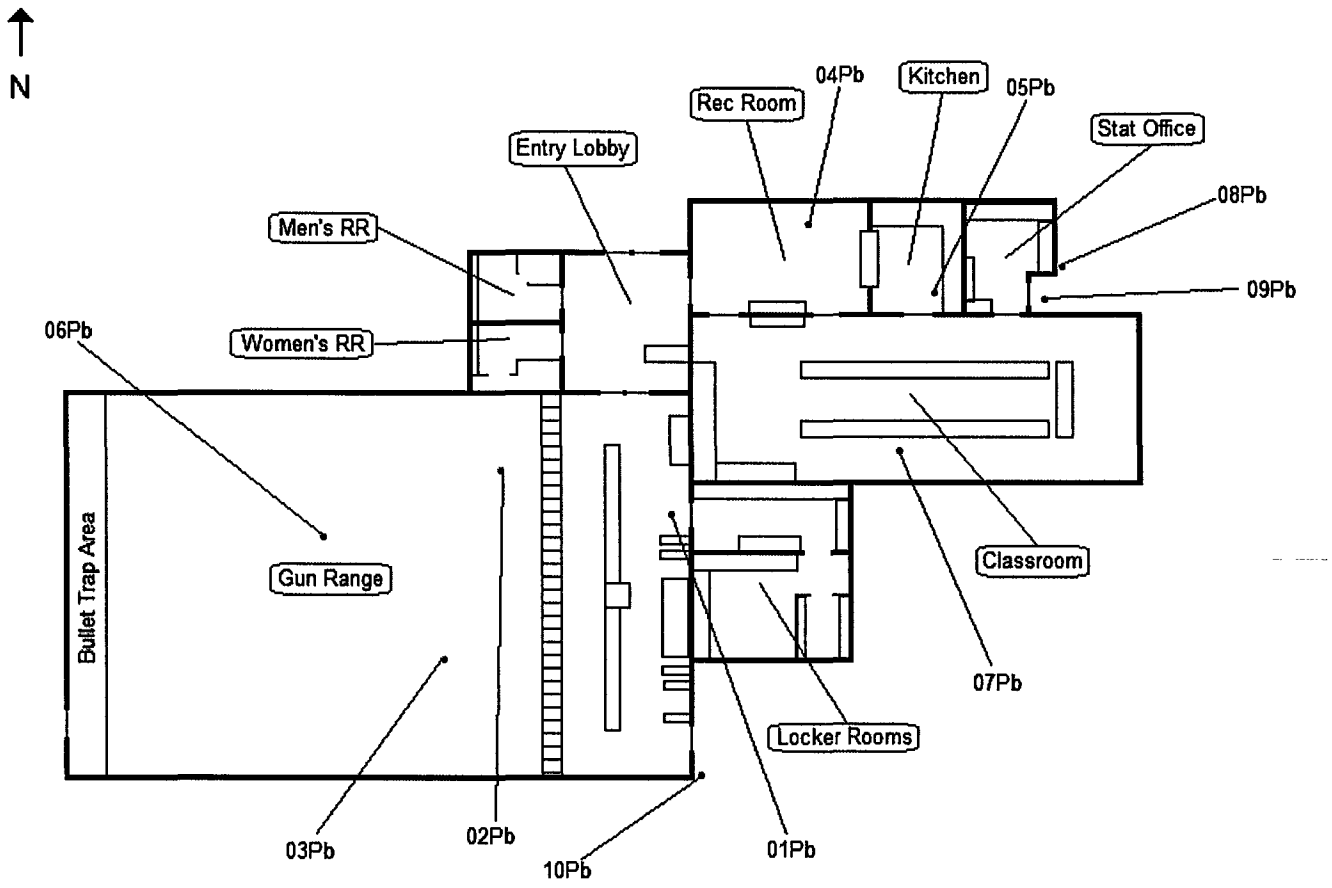
879

SAMPLE #	MATERIAL DESCRIPTION/LOCATION	
ECG-16-3934-01Pb	Green Wall Paint on Concrete; Range	3400/.34
ECG-16-3934-02Pb	Brown Railing Paint on Metal; Range	7900/.79
ECG-16-3934-03Pb	Brown Stall Paint on Metal; Range	4800/.48
ECG-16-3934-04Pb	White Roof Joist Paint on Wood; Break Room	210/.021
ECG-16-3934-05Pb	Varnish on Wood; Classroom	3500/.35
ECG-16-3934-06Pb	Beige Roof Joist Paint on Wood; Range	2900/.29
ECG-16-3934-07Pb	Red Floor Coating; Classroom	300/.030
ECG-16-3934-08Pb	Exterior Brown Door Frame Paint on Wood; Entrance to Classroom	4100/.41
ECG-16-3934-09Pb	Exterior Brown Fascia Paint on Wood; Entrance to Classroom	52000/5.2
ECG-16-3934-10Pb	Exterior Beige Wall Paint on Concrete; Range	230/.023

Z:\Clients\City of Sacramento\16-3934 Mangan Park - Lead\Bulk Sample Pb\Bulk Request Pb 06-06-16.wpd

Delivered by: Melissa Tracey MTracey **Date:** 06/06/16 **Time:** 1539

Received by: [signature] **Date:** 6/6/16 **Time:** 1539 **AM/PM**



All Samples Preceeded by: ECG- 16-3934

City of Sacramento Mangan Rifle & Pistol Range 2140 34th Avenue Sacramento, CA 95822	Entek Consulting Group, Inc. 4200 Rocklin Road, Suite 7 Rocklin, CA 95677 Map Not to Scale	Lead Bulk Sample Locations Collected by Blake Howes on June 6, 2016 Project Number 16-3934

LEAD HAZARD EVALUATION REPORT

Section 1 – Date of Lead Hazard Evaluation 6-6-16

Section 2 – Type of Lead Hazard Evaluation (Check one box only)

☐ Lead Inspection ☐ Risk Assessment ☐ Clearance Inspection ■ Other (specify) Please See Attached Letter Dated 4-21-15

Section 3–Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
2140 34TH Avenue	Sacramento	Sacramento	95822

Construction date (year) of structure	Type of structure	Children living in structure?
Late 1960's	☐ Multi-unit building ☐ School or daycare ☐ Single family dwelling ■ Other (specify) Firearm Range	☐ Yes ■ No ☐ Don't Know

Section 4–Owner of Structure (If business/agency, list contact person)

	Telephone Number
City of Sacramento, Department of Public Works, Mr. Karl Kurka	(916) 808-8430

Address [number, street, apartment (if applicable)]	City	State	Zip Code
915 I Street, 2nd Floor	Sacramento	California	95814

Section 5–Results of Lead Hazard Evaluation (Check all that apply)

☐ No lead-based paint detected ■ Intact lead-based paint detected. ☐ Deteriorated lead-based paint detected

☐ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead contaminated soil found ☐ Other _____

Section 6–Individual Conducting Lead Hazard Evaluation

Name	Telephone Number
Entek Consulting Group, Inc. - Blake Howes	(916) 632-6800

Address [number, street, apartment (if applicable)]	City	State	Zip Code
4200 Rocklin Road, Suite 7	Rocklin	CA	95677

CDPH certification number	Signature	Date
23951	Blake Howes	6-14-16

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

N/A

Section 7–Attachments

A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;

B. Each testing method, device, and sampling procedure used;

C. All data collected, including quality control data, laboratory results, indicating laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

ENTEK
CONSULTING GROUP, INC.
4200 Rocklin Road, Suite 7, Rocklin, CA 95677 Telephone (916) 632-6800 Fax (916) 632-6812 www.entekgroup.com

April 21, 2015

State of California
Health and Human Services Agency
California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Parkway, Building P, Third Floor
Richmond, CA 94804-6403

RE: Lead Hazard Evaluation Report (CDPH 8552 - 6/07)

To Whom it May Concern:

In a memorandum issued to all "California Department of Health Services Certified Inspector/Assessors and Project Monitors", by the State of California - Health and Human Services Agency, Department of Health Services (CDPH), dated June 5, 2006, and signed by Mr. Paul Fitzmaurice, Chief, Lead Hazard Reduction Section, Childhood Lead Poisoning Prevention Branch, it was made clear that"... the on-site investigation, for compensation, of lead-based paint or lead hazards..." includes"... conducting testing and/or sampling activities as part of a non-'abatement' project (e.g. painting remodeling, etc.)."

As a result of this directive, Entek Consulting Group, Inc. (Entek) is providing you with the current CDPH Form 8552 (06/07) documenting an inspection/assessment performed by Entek.

The investigation results being reported on the attached CDPH Form 8552 do not reflect a "Lead Inspection/Assessment" as defined in Title 17. As a result the "Other" box, in "Section 2 - Type of Lead Hazard Evaluation", is checked. This is being done to make it clear this investigation does not meet the definition of a "Lead Inspection/Assessment", and submission of the attached CDPH Form 8552 is not meant to reflect that it does.

CDPH Form 8552, Section 5 - Results of Lead Hazard Evaluation, does not allow for an appropriate option pertaining to the results of the investigation/assessment performed and being reported (i.e. for the purpose of compliance with Cal/OSHA, Title 8 1532.1 Lead), or an assessment being performed in an unregulated structure. While one of or more of the four boxes is checked to reflect the results of the inspection/assessment. The lead inspection/assessment was not required under Title 17.

This letter is not intended to disagree whether a CDPH Form 8552 must be submitted, but is for clarification as to the information included on the CDPH Form 8552, and its intended purpose, namely to reflect the goal of the services performed by Entek.

Sincerely,

Richard A. Beall, CIH, CSP
President

Z:\Lead\Lead Hazard Evaluation Report CDPH 8552 Ltr 4-21-15.wpd

ENTEK

APPENDIX C

BACK UP DOCUMENTATION

- Inspector Accreditations and Certifications
- Laboratory Accreditations for Asbestos and Lead Analysis

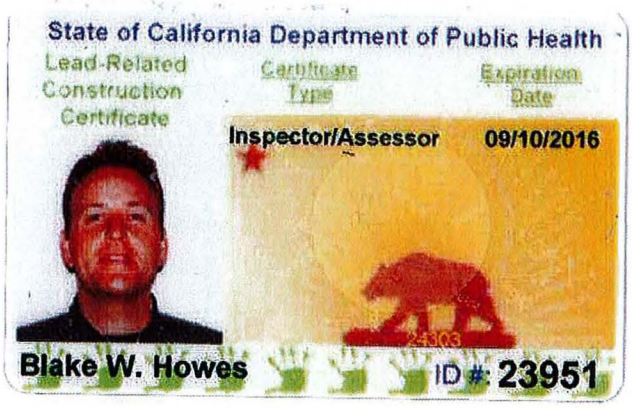
State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Blake W Howes
Name

Certification No. **13-5015**

Expires on **04/17/17**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.


State of California Department of Public Health
Lead-Related Construction Certificate
Certificate Type
Expiration Date
Inspector/Assessor
09/10/2016
Blake W. Howes
ID #: 23951

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ASBESTECH
6825 Fair Oaks Blvd., Suite 103
Carmichael, CA 95608
Mr. Tommy Conlon
Phone: 916-481-8902 Fax: 916-481-3975
E-Mail: asbestech@sbcglobal.net
URL: http://www.asbestechlab.com

BULK ASBESTOS FIBER ANALYSIS (PLM) **NVLAP LAB CODE 101442-0**

NVLAP Code	*Designation / Description*
18/A01	EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

2015-07-01 through 2016-06-30
Effective dates

For the National Institute of Standards and Technology

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101442-0

ASBESTECH

Carmichael, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2015-07-01 through 2016-06-30

Effective dates

For the National Institute of Standards and Technology

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

Asbestech

6825 Fair Oaks Boulevard, Suite 103

Carmichael, CA 95608

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site inspection, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1153**

Expiration Date: **3/31/2018**

Effective Date: **4/1/2016**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

Asbestech

6825 Fair Oaks Boulevard, Suite 103
Carmichael, CA 95608
Phone: (916) 481-8902

Certificate No. 1153
Expiration Date 3/31/2018

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste			
114.130	001	Lead	EPA 7420
Field of Testing: 115 - Extraction Test of Hazardous Waste			
115.021	001	TCLP Inorganics	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II
Field of Testing: 121 - Bulk Asbestos Analysis of Hazardous Waste			
121.010	001	Bulk Asbestos	EPA 600/M4-82-020

As of 12/17/2015 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

APPENDIX C

United States Housing and Urban Development (HUD)
Chapters 6 and 13

Chapter 6: Ongoing Lead-Safe Maintenance

Chapter 6: Ongoing Lead-Safe Maintenance

Step-by-Step Summary
Ongoing Lead-Safe Maintenance: How to Do It

1. **Managing a lead-safe maintenance program.** Whether they do the work personally, have their staff perform the maintenance work (in either case, the rental owners must become certified renovation firms and have the work supervised by a certified renovator), or use outside maintenance contractors, owners should develop a written program defining the scope and procedures of lead-safe maintenance that apply to each pre-1978 property and should assign responsibilities for carrying out the elements of the program. Maintenance workers should be trained in lead-safe work practices and should be instructed on how to perform these functions in conjunction with normal duties. The project supervisors for these maintenance workers must be certified renovators, and the firm performing the work –whether owner's firm or the outside maintenance contractor – must be a certified renovation firm when the work may disturb lead-based paint in amounts above the EPA's minor repair and maintenance activities threshold. Work order forms should be changed (if necessary) to include items in the lead-based paint maintenance work order form in this chapter. If no work order is used, owners should develop a system to inform maintenance project supervisors and maintenance workers when a job may involve a lead hazard or lead-based paint. For multi-family housing, the lead-safe maintenance program should be included in the Lead Hazard Control Plan discussed in Chapter 11.

2. **Visual assessments.** Periodic visual assessments should be conducted to identify deteriorated paint, unusual amounts of visible dust, paint-related debris, and structural or other problems that may be causing some of those conditions. Visual assessments must be trained by individuals trained in performing them. Training in performing visual assessments is available on line on the HUD lead website, and in certain EPA lead safety courses, such as the risk assessment certification training. Also, the visual assessment should identify bare soil.

   Visual assessments should be conducted at the following times:

   - Whenever the owner receives a resident complaint regarding paint deterioration or other potential lead hazard in a dwelling unit or common area.
   - Whenever the dwelling turns over or becomes vacant.
   - Whenever significant damage occurs (i.e., flooding, vandalism, fire).
   - At least once every year.

3. **Maintain information on lead-based paint and lead hazard controls.** Before beginning work on a painted surface, determine whether it is known if lead-based paint is or is not present on the surface. If paint testing has *not* been conducted and the component was installed before 1978, presume lead-based paint is present, or have the paint tested.

   If paint testing *has* been conducted on some or all surfaces on the property, it is recommended that owners and managers develop and keep up-to-date a ready-to-use list of surfaces that are known to

contain or not to contain lead-based paint, using an inventory form like that provided in this chapter (Form 6.3; this and all other forms in this chapter are at its end). Information on the presence or absence of lead-based paint should be based on testing by a certified lead-based paint inspector, risk assessor, or renovator, except that, as of the publication of this edition of these *Guidelines*, a spot test kit may not be used to determine the presence of lead-based paint. Also, if lead-based paint hazard controls have been conducted on the property, it is recommended that owners and managers maintain a similar list of lead-based paint hazard controls, if any have been conducted (Form 6.4).

4. **Determine resident protection and worksite preparation measures.** Before beginning a maintenance or renovation job that will disturb paint or soil, determine, based on the guidance provided in Chapter 8, what resident protection and worksite preparation measures should be implemented. If a written work order system is used, complete work order forms for each job, defining and documenting specific protective measures to be used (Form 6.5). Whether or not a written work order system is used, inform workers of the required protective measures.

5. **Educate residents before starting work.** The U.S. Environmental Protection Agency (EPA) requires that a person performing a paint-disturbing job for compensation, including staff of a housing development, must educate residents on lead-based paint hazards in the home and provide residents of each affected unit with a copy of the *"Lead-Safe Certified Guide to Renovate Right"* lead hazard information pamphlet or an EPA-approved State or Tribal alternative pamphlet. This education must occur within 60 days before beginning a maintenance or renovation job (***http://www.epa.gov/opptintr/lead/pubs/renovaterightbrochure.pdf***). This is required under the EPA's "Pre-Renovation Education" Rule (40 CFR Part 745). It does not apply if the job is a "minor repair and maintenance activity" as defined by the EPA (or a State or Tribal authorized renovation certification program). Note that the EPA's Pre-Renovation Education Rule is different from the EPA-HUD Lead-Based Paint Disclosure Rule, which requires that owners inform *prospective* tenants or buyers of any known lead-based paint and lead-based paint hazards on the property before the tenant is obligated under a lease or sales contract, and to provide the prospective tenants or buyers with a different lead hazard information pamphlet, *Protect Your Family From Lead In Your Home*, among other requirements (see Appendix 6).

6. **Conduct the work using lead-safe work practices.** Properly trained workers should correct problems found by visual assessments; these workers must be supervised by certified renovators working for certified renovation firms if the deteriorated paint being corrected is in amounts above the EPA's minor repair and maintenance activities threshold. The workers should conduct all maintenance and renovation work in pre-1978 properties using lead-safe work practices, resident protection, and worksite preparation measures, in a manner consistent with Chapter 8 of these *Guidelines*. For a discussion of the applicable regulations, see Appendix 6.

7. **Do not use prohibited paint-removal practices.** Workers must *not* remove paint using the following methods in HUD-assisted housing; the last three are permitted in unassisted housing:

   - Open flame burning or torching.
   - Heat guns operating above 1100 degrees Fahrenheit or charring the paint.
   - Machine sanding or grinding without a HEPA local exhaust control.
   - Abrasive blasting or sandblasting without HEPA local exhaust control.

- Manual dry sanding or dry scraping, except dry scraping is acceptable in conjunction with heat guns operating at no more than 1100 degrees Fahrenheit or within one foot of electrical outlets or when treating defective paint spots totaling no more than 2 square feet in any one interior room or 20 square feet on exterior surfaces.

- Paint stripping in a poorly ventilated space when using a volatile stripper that is a hazardous substance in accordance with regulations of the Consumer Product Safety Commission (CPSC) at 16 CFR 1500.3(b)(4) (***www.cpsc.gov/businfo/notices.html*** or) and/or a hazardous chemical in accordance with the OSHA regulations at 29 CFR 1910.1200 for 1926.59, as applicable to the work (***www.osha.gov/***). Paint removers with methylene chloride should be avoided.

In addition, these *Guidelines* recommend strongly against the use of power washing or uncontained hydroblasting.

8. **Clean the work area and other work-related spaces.** After finishing the work, clean the following spaces in accordance with guidance provided in Chapters 8 and 14: work areas, spaces immediately adjoining the work areas, and passageways and storage spaces used by workers. Be sure to clean window troughs associated with the work area, as well as floors, interior window sills, and, for high-dust jobs, walls in the work area.

9. **Clearance examination.** Have a clearance examination performed in accordance with guidance in Chapter 15. Clearance is not required if the area of paint that was disturbed is no more than that specified in item 11, below, or if the work was conducted in unassisted housing under the EPA's Renovation, Repair, and Painting (RRP) Rule. Clearance examinations must be conducted by certified risk assessors, sampling technicians, or lead-based paint inspectors. Qualifications and requirements vary by State.

10. **Communicate with residents.** In rental housing, notify residents of the results of the clearance examination, if applicable, and of any other actual knowledge about lead-based paint and lead-based paint hazards obtained during the project. In HUD-assisted housing, this information must be communicated within 15 days after obtaining the clearance results. Urge residents to clean their units frequently to control dust accumulation. Ask residents to report occurrences of deteriorated paint, failed lead hazard controls (if applicable), and bare soil (if applicable), so that owners can promptly correct situations that are potential hazards.

11. **Consider the amount of paint disturbance**. HUD and EPA regulations do not require trained workers, lead-safe work practices or clearance/cleaning verification if the area of paint being disturbed is less than the applicable threshold area:

    - For HUD-assisted housing, HUD defines *de minimis* areas as: (a) 20 square feet (2 square meters) or less on exterior surfaces, (b) 2 square feet (0.2 square meters) or less in any one interior room or space, or (c) 10 percent or less of the total surface area on an interior or exterior component with a small surface area (such as window sills, baseboards, or other trim).

    - For unassisted housing, EPA defines minor repair and maintenance activities as those that disrupt 6 square feet or less of painted surface per room for interior activities or 20 square feet or less of painted surface for exterior activities where none of the work practices prohibited or restricted by 40 CFR 745.85(a)(3) are used (see unit II.C.3) and where the work does not involve window replacement or demolition of painted surface areas.

These *Guidelines*, however, strongly recommend that workers adhere to the following practices when disturbing any paint applied before 1978, even if lead-safe work practices are not required by regulation:

(a) Never use HUD- or EPA-prohibited methods of paint removal, and

(b) If young children reside in the unit or frequent the common area, always keep residents out of the work area until after clean-up and workers have cleaned the work area and themselves thoroughly after finishing, and, when clearance or cleaning verification, when conducted, has been passed.

12. **Document all activities.** The results of visual assessments and any corrective measures taken should be documented, and such reports should be retained, especially in rental housing. Reports that document ongoing lead-safe maintenance may provide some degree of protection against charges of negligence if a child is found to have an elevated blood lead level.

I. Introduction

This chapter describes the procedure for maintaining housing in a lead-safe condition. Property owners and managers may use this procedure after completion of lead hazard controls, or, if applicable regulations permit, they may initiate a lead-safe maintenance program without completing any initial hazard controls. This chapter provides guidance to owners and managers of pre-1978 housing properties for guidance on how to maintain the housing in a lead-safe manner in accordance with the Environmental Protection Agency (EPA) Renovation, Repair, and Painting (RRP) Rule (40 CFR 745), and, for housing receiving HUD assistance, to properties covered by HUD's Lead Safe Housing Rule (24 CFR Part 35).

Owners and managers of properties that are covered by the HUD Lead-Safe Housing Rule should use this chapter as guidance on how to carry out the "ongoing lead-based paint maintenance" that is required by that regulation. The term "ongoing lead-safe maintenance," as used in this chapter, is intended to mean the same thing as the term "ongoing lead-based paint maintenance," as used in the HUD Lead-Safe Housing Rule. Pre-1978 properties that are required by the HUD Lead-Safe Housing Rule to incorporate ongoing lead-based paint maintenance into regular building operations include those receiving multi-family mortgage insurance, project-based assistance, rehabilitation assistance under the HOME program, tenant-based rental assistance (such as the Housing Choice Voucher Program), assistance under the Public Housing Program, and certain other types of assistance. This is not a complete list. Exemptions and exceptions may apply. Owners, managers or local program directors who are in doubt about HUD requirements should refer to the regulation at 24 CFR Part 35, contact their HUD field office, call the Lead Regulations Hotline at (202) 755-1785, extension 7698 (not a toll-free call), or e-mail HUD at: ***Lead.regulations@hud.gov***. (Hearing- or speech-challenged individuals may access this number through TTY by calling the toll-free Federal Relay Service at 800-877-8339.)

Activities that are required by HUD or EPA are identified in this chapter as being "required" or as actions that "must" be done. Activities that are not required by HUD but are recommended by these *Guidelines* are identified as being "recommended" or as actions that "should" be done. Activities that may be done at the discretion of the owner or manager are identified as "optional."

Lead-safe maintenance is necessary because the potential exists for lead-based paint hazards to develop wherever lead-based paint is present. Previously intact lead-based paint can become deteriorated, lead hazard controls can fail, and maintenance or renovation can disturb leaded paint and generate lead in dust. The purposes of ongoing lead-safe maintenance are: (1) to assure that if potential lead hazards occur or reoccur, they will be spotted and controlled promptly before young children become exposed to lead; and (2) to assure that maintenance and renovation work that disturbs leaded paint will not cause lead exposure during the work and will not leave dwellings or the nearby environment contaminated with leaded-dust when the work is finished. If ongoing lead-safe maintenance is done with care, the probability of childhood lead exposure from lead-based paint hazards on the property is significantly reduced. Also, it is unlikely that a subsequent professional reevaluation, if required, will find any deteriorated paint or failed hazard control treatments, thereby substantially reducing the cost to the owner. (Reevaluation is described in section VII of Chapter 5.)

Ongoing lead-safe maintenance consists of:

- **Periodic visual assessments** to identify deteriorated paint, unusual amounts of visible dust, paint-related debris, failed lead hazard controls (if applicable), bare soil (if soil-lead hazard control is required or recommended), horizontal surfaces that are not easily cleanable (optional), chewable

surfaces with evidence of teeth marks (optional), and problems (structural and otherwise) that may be causing some of the foregoing conditions.

- **Correction of problems found in the visual assessments**, using lead-safe work practices for jobs that exceed a *de minimis* area (a minimal amount of paint disturbance, which is explained more fully in section II.C.3, below).
- **Using lead-safe work practices** when making all other paint-disturbing repairs and renovations exceeding the *de minimis* level.
- **Conducting a clearance examination** after any paint-disturbing work that exceeds the *de minimis* level.
- **In rental housing, asking residents to report to management** occurrences of deteriorated paint, chewing by young children on painted surfaces, failed lead hazard controls (if applicable), and bare soil (if applicable), so that owners can promptly correct situations that may be lead-based paint hazards.

Owners, managers, or maintenance staff can perform visual assessments and lead-safe work practices with only modest training. Lead-safe work practices are modifications to traditional maintenance and renovation methods. They are described in general terms in this chapter and in detail in other chapters of these *Guidelines*. Clearance examinations, however, must be done by a certified professional.

Ongoing lead-safe maintenance should be conducted in all dwelling units and common areas, unless the property is exempt, and the scope should include all exterior and interior surfaces where lead-based paint is known or presumed to be present. Also, lead-safe maintenance of ground cover is recommended if Government regulations affecting the property require that soil-lead hazards be identified and controlled, or if the owner or manager has information from a reliable source that soil-lead hazards have been found on the property. Otherwise, lead-safe maintenance of ground cover is optional in ongoing lead-safe maintenance.

These *Guidelines* recommend that lead-safe maintenance be practiced in all pre-1978 residential properties in which lead-based paint is known to be present or may be present. While lead-safe maintenance practices were designed initially for rental housing, the rationale and the basic procedure apply just as well to owner-occupied housing.

HUD regulations do not require ongoing lead-safe maintenance in residential properties found by a certified lead-based inspector to contain no lead-based paint, as defined by applicable Federal, State, Tribal or local regulations. Similarly, EPA regulations do not require lead-safe work practices in residential properties or child-occupied facilities found by such a lead-based inspection to be free of lead-based paint. The Federal standard for applied lead-based paint is paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter or 0.5 percent by weight (the latter equivalent to 5,000 parts per million by weight). HUD and EPA regulations do not require lead-safe work practices if amounts of paint to be disturbed are below specific threshold amounts (see section II.C.3, below) or if the specific paint being disturbed is known not to be lead-based paint.

However, many pre-1978 painted surfaces that are classified as not being lead-based paint under Government standards may still contain *some* lead that can cause environmental contamination and human exposure if not handled correctly. Therefore, these *Guidelines* recommend the following work practices when disturbing any paint installed before 1978, regardless of whether it is or is not lead-based paint and regardless of whether the amount of paint to be disturbed is less than the applicable *de minimis* area:

(1) *Never use the prohibited methods of paint removal* that are described in this and other chapters of these *Guidelines*; and

(2) When disturbing paint *in housing occupied by children of less than 6 years of age,* clean the work area thoroughly after finishing, preferably with a vacuum and wet cleaning, and keep residents out of the work area until after the clean-up.

The rest of this chapter consists of three sections. Section II describes visual assessments in detail. Section III describes the lead-safe maintenance practices to be used in performing repairs, maintenance, or renovation. Section IV provides information on how to develop and manage an ongoing lead-safe maintenance program.

This chapter does not provide guidance on reevaluation. That subject is discussed in section VII of Chapter 5.

II. Visual Assessment

This section describes the scope, frequency, and methods to be used in visual assessments for lead-safe maintenance. Please note that this visual assessment is somewhat different than the visual assessments that are components of a risk assessment (described in Chapter 5) and a clearance examination (described in Chapter 15).

A. Frequency and Scope

The owner or owner's representative should perform, at least once a year, a visual assessment of each dwelling unit, each common area that is used by residents, exterior painted surfaces, and ground cover (if control of soil-lead hazards is required or recommended) (see Figure 6.1). Visual assessments should also be conducted when the owner or management receives complaints from residents about deteriorated paint or other potential lead hazards, when a dwelling turns over or becomes vacant, or when significant damage occurs that could affect the integrity of hazard control treatments (e.g., flooding, vandalism, fire).

FIGURE 6.1 Visual Assessment.

People performing a visual assessment should determine whether any of the following are present:

- **Deteriorated paint on surfaces** (both interior and exterior) that are known or presumed to be coated with lead-based paint; and the estimated size of area;
- **Visible settled dust** that clearly exceeds normal housekeeping standards;
- **Paint-related debris** (for example, paint chips or residue from paint stripping);
- **Failed lead-based paint hazard controls**, if any have been installed, particularly encapsulations and enclosures of paint surfaces, treatments of window friction surfaces, coverings of painted floors or stair treads, or coverings of bare soil;

- **Structural and other problems that may be causing paint deterioration or the failure of lead-based paint hazard controls**, such as water leaks and windows and doors with friction or impact surfaces; or
- **Bare soil** in outdoor play areas and other yard areas known to contain or presumed to contain lead in soil exceeding applicable standards, if soil-lead hazard control is required or recommended.

In addition, identification of the following items is optional:

- Horizontal surfaces that are not easily cleanable, and
- Chewable surfaces with evidence of teeth marks.

The findings of a visual assessment, including the exact location of any occurrences of the conditions listed above, should be recorded on Form 6.0 or a similar form. Corrective maintenance should be performed if any of these conditions are present.

B. Information on Known Hazards and Existing Hazard Controls

If testing of paint or soil and/or control or treatment of paint-lead or soil-lead hazards has been conducted in the areas to be visually assessed, the person performing the visual assessment should have the following information:

- The location of paint that is known to be lead-based paint and the location of paint that is known not to be lead-based paint. All other paint in pre-1978 housing should be presumed to be lead-based paint. According to Federal standards, lead-based paint is applied paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter (mg/cm^2) or more than 0.5 percent by weight or 5,000 parts per million (ppm). Standards issued by an EPA-authorized State, Tribal or local program may be different, and should be used if more stringent (i.e., lower). Information about the presence or absence of lead-based paint should be recorded on Form 6.0 or a similar form.
- The type and location of each control or treatment of a paint-lead hazard this is readily accessible to the visual assessor, except that (1) information on abatements that removed all lead-based paint is not necessary, and (2) information on paint stabilization is optional because failure of paint stabilization will be visually evident.
- The location of soil that is known to contain and not to contain soil-lead hazards and the type and location of each control or treatment of a soil-lead hazard, if control of soil-lead hazards is required or recommended. According to Federal standards, a soil-lead hazard is bare soil that contains total lead equal to or exceeding 400 ppm in a play area or an average of 1,200 ppm of bare soil in other parts of the yard. Standards issued by an EPA-authorized State, Tribal or local program may be different, and should be used if more stringent (i.e., lower).

Section IV.C.3, below, provides guidance on keeping inventories of known lead-based paint and controls and treatments that are in place.

C. Identifying Deteriorated Paint, Excessive Dust and Debris, and Failed Lead Hazard Controls

1. Training

It is not necessary to be a certified lead-based paint inspector, risk assessor or renovator to perform visual assessments for ongoing lead-safe maintenance, but people performing visual assessments must be trained to do so. While the inspector, risk assessor and renovator certification training courses include visual assessment training, for people who do not need to become certified in those disciplines, HUD recommends they take its module on visual assessment for deteriorated paint available on the Internet at ***http://www.hud.gov/offices/lead/training/*** (see Figure 6.2). This course usually takes approximately one hour to complete. It is available as a self-paced, web-based training module. This module also includes the option to print a notice of course completion, which should be kept in the visual assessor's file.

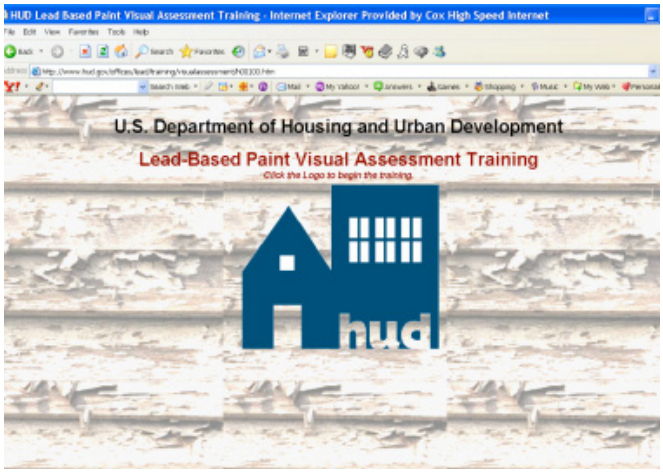


FIGURE 6.2 **Opening screen from HUD's first on-line visual assessment training curriculum. Updates may occur.**

It is also recommended that owners and managers give those performing visual assessments a brief orientation or the information on: (1) the types of structural and other problems to look for that may be causing paint deterioration; (2) the types of lead-based paint hazard controls that have been used on the property, if any, and the signs of failure that should be identified; (3) what to look for with regard to bare soil, if control of soil-lead hazards is required or recommended; and (4) any optional considerations that the owner wants to identify in the assessment, such as surfaces that are not smooth and cleanable, and chewable surfaces with evidence of teeth marks.

2. Deteriorated Paint

Ongoing maintenance of painted surfaces is desirable for several reasons: (1) it helps prevent childhood lead poisoning; (2) it is cost-effective; and (3) it improves the condition and appearance of the property. Deterioration of lead-based paint is hazardous to young children because it may make it easier for a child to put contaminated paint in his or her mouth and because it may contribute to lead in house dust to which the child is exposed. Preventive maintenance can considerably extend the life of paint coatings, especially on the exterior.

Chapter 5 contains detailed information on how to visually identify deteriorated paint (see text at section II.D.3 of Chapter 5). All interior and exterior paint that is peeling, cracking, alligatoring, blistering, damaged, or separated from the substrate should be reported. Nail holes and hairline cracks are not considered to be deterioration.

If deteriorated paint is present, the person performing the visual assessment should describe its location on Form 6.0 or similar form, by room, building component, and specific location on the component. If it is known, as a result of previous paint testing, whether the paint is or is not lead-based paint, that information should also be entered on Form 6.0. It is recommended that there also be recorded on the form an estimate of the approximate area (in square feet) of each

occurrence of deteriorated paint. These area estimates will assist in planning maintenance work and will indicate whether the area of paint that will be disturbed is large enough that full lead-safe work practices must be used and a clearance examination must be conducted, as required in properties subject to the HUD Lead-Safe Housing Rule (see the following section on *de minimis* paint disturbance below). Finally, it is recommended that the visual assessor record any observed structural or other problems that may be causing paint deterioration (see section II.C.6, below).

Note that Forms 5.2 and 6.0 both cover visual assessments, the former for risk assessments, and the latter for visual assessments; intentionally, they are identical, which is why the forms have double titles.

3. Small Amounts of Paint

As described above, the area estimates in the visual assessments will determine how the repair or work is to be performed.

- HUD's Lead Safe Housing Rule states (24 CFR 35.1350(d)) that lead-safe work practices and clearance are not required in HUD-assisted "target housing"[1] if the total amount of paint disturbed by the work is no more than:

  (1) 20 square feet on exterior surfaces,

  (2) 2 square feet in any one interior room or space, or

  (3) 10 percent of the total surface area on an interior or exterior component with a small surface area (such as window sills, baseboards, and trim).

- EPA's Renovation, Repair, and Painting (RRP) Rule does not cover minor repair and maintenance activities (40 CFR 745.83) in target housing or pre-1978 child-occupied facilities that disrupt no more than:

  (1) 6 square feet or less of painted surface per room for interior activities, or

  (2) 20 square feet or less of painted surface for exterior activities, and where none of the work practices prohibited or restricted by that rule (open-flame burning or torching of lead-based paint, using machines that remove lead-based paint through high-speed operation without HEPA exhaust control; and operating a heat gun on lead-based paint at or above 1100 degrees Fahrenheit) are used and where the work does not involve window replacement or demolition of painted surface areas.

  These *Guidelines* recommend, however, that the following practices *always* be observed when disturbing paint in pre-1978 housing or child-occupied facilities, unless it is known that all layers of paint to be disturbed have been applied after 1977:

  (1) Never use the prohibited methods of paint removal that are described in section III.C.1, below; and

  (2) When disturbing paint *in housing occupied by children of less than 6 years of age, and child-occupied facilities,* always clean the work area thoroughly after finishing, preferably with a vacuum and wet cleaning, and keep occupants out of the work area

1 Target housing is defined by Title X as meaning any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides or is expected to reside in such housing) or any 0-bedroom dwelling. Most pre-1978 housing is target housing.

while work is underway and until after the clean-up and passing of clearance or cleaning verification, as applicable.

4. Visible Dust and Debris

The visual assessor should record on Form 6.0 or similar form, the location of any visible dust that exceeds normal housekeeping standards and any paint-related debris observed in dwelling units and common areas. If a dwelling unit is occupied, the residents should be notified that such dust or debris may be a hazard, and they should be urged to keep the dwelling clean. Form 6.0 provides a place to check whether residents are so notified. Of course, the owner should clean-up dust and debris in unoccupied dwelling units and common areas.

5. Failed Lead Hazard Controls

If any lead-based paint hazard controls are in place in the area being observed, the person performing the visual assessment should examine each such control, determine whether it is or is not still intact, and record the observation on Form 6.0 or similar form, including a brief written description of the problem. Although paint stabilization is a valid method of interim control of deteriorated lead-based paint, it is not necessary to make a special effort to examine all previous paint stabilizations, because the failure of paint stabilization will be caught by the identification of deteriorated paint.

6. Structural and Other Problems Causing Paint Deterioration and Hazard Control Failure

Chapter 11, section III.A**,** describes some of the problems that could cause premature paint failure or failure of lead-based paint hazard controls. People performing visual assessments should be familiar with this material and should briefly describe any such observed conditions on Form 6.0 or similar form. The most common cause of paint deterioration is moisture, which may derive from leaks in the roof, windows, walls, doors, or plumbing. The moisture may cause decay, rusting, or other deterioration of the building component that is painted, or it may affect just the paint. Other causes, in addition to moisture, include ultraviolet rays, extreme heat and cold, wind, and mechanical damage.

The visual assessor should also indicate on the form whether deteriorated paint results from friction or impact, because these conditions affect the method used to make a durable repair. A friction surface is a surface that is subject to abrasion or friction, such as certain window, floor, and stair surfaces (24 CFR 35.110, 40 CFR 745.63) may generate lead-contaminated dust if the paint is lead-based paint. The most common painted friction surfaces are on the channels in which the sashes of double-hung windows slide. Another common location is the edge or the head, jamb, or sill of doors that are poorly hung.

An impact surface is a surface that is subject to damage by repeated sudden force, such as certain parts of door frames (24 CFR 35.110, 40 CFR 745.63). Generally, the owner is responsible only for impact damage generated by a malfunctioning building component, such as a door knob banging against a wall. However, impact damage caused by residents should be taken into account when determining how to stabilize deteriorated paint on such surfaces.

D. Identifying Chewable Surfaces

Young children sometimes eat or mouth non-food articles. A chewable surface, such as a protruding interior window sill that is painted with lead-based paint, can be a dangerous hazard to them. Owners should ask visual assessors to look for potential chewable-surface hazards if a young child lives in the dwelling unit. To be a hazard, according to EPA regulations, a chewable surface must have evidence of teeth marks, but some States do not require bite marks for a surface to be considered a chewable-surface hazard.

These *Guidelines* recommend visual assessment of chewable surfaces only if a child under age 6 resides in the unit or the owner knows that a child under 6 is expected to reside there in the near future, and in pre-1978 child-occupied facilities. If a parent, guardian, or care giver is present at the time of the visual assessment, the assessor may ask whether a child has been observed chewing on painted surfaces, and, if so, which surfaces. Any identified surfaces should then be examined for evidence of teeth marks. If no parent or guardian is present, the visual assessor should examine interior window sills for teeth marks. Hard metal substrates and other materials that cannot be dented by the bite of a young child are not considered chewable.

E. Identifying Bare Soil

The visual assessment should also include an inspection of play areas and other yard areas to identify bare soil (see Figure 6.3) if one or more of the following conditions exists:

- Government regulations (Federal, State, Tribal or local) affecting the subject property require that bare soil be tested for lead and/or that known or presumed soil-lead hazards be controlled;
- The owner has actual knowledge, based on laboratory analysis of soil samples, that soil-lead hazards (as defined by Federal, State or Tribal regulations) have been found on the property and have not been abated; or
- The owner has actual knowledge, based on laboratory analysis of soil samples, that soil-lead hazards (as defined by Federal, State or Tribal regulations) have been found *consistently* on three or more other similar properties in the immediate neighborhood of the subject property (e.g., same block or block across the street), even though the owner does not have testing data showing that soil on the subject property does not contain soil-lead hazards.

Even if these conditions do not apply, an owner may wish, at his or her option, to take special precautions regarding ground cover if it is generally known that some soil in the neighborhood may be contaminated with lead and if young children reside in the property.

Bare soil means soil or sand not covered by grass, sod, other live ground covers, wood chips, gravel, artificial turf, or similar covering. (24 CFR 35.110) (see Figure 6.3)

FIGURE 6.3 An area of bare soil beneath a window with deteriorated paint.

A visual assessment for bare soil should include identification and reporting (on Form 6.1 or similar form) of any failures of earlier interim controls or abatements of soil-lead hazards as well as new areas of bare soil that have not been subject to hazard control. Information on failed hazard controls may be useful in selecting methods that will have a longer effective life.

The visual assessment for bare soil should distinguish between play areas and non-play areas. A play area is defined as an area of frequent soil contact by children of less than 6 years of age as indicated by, but not limited to, such factors as the presence of play equipment (e.g., sandboxes, swing sets, and sliding boards), toys, other children's possessions, observations of play patterns, or information provided by parents, residents, care givers, or property owners (24 CFR 35.110, 40 CFR 745.63). All play areas should be free of bare soil, unless it has been determined by a qualified professional (i.e., a certified risk assessor in most jurisdictions) that lead levels in the soil do not exceed applicable standards.

In non-play areas, however, bare soil totaling no more than 9 square feet (or 0.8 square meters) per property may be considered *de minimis*; that is, less than 9 square feet of bare soil with levels of lead exceeding applicable standards is not likely to constitute a hazard. The EPA and some States do not recognize this bare-soil *de minimis* level. "However, EPA highly recommends using the HUD *Guidelines* for risk assessment. This would avoid declaring very small amounts of soil to be a hazard in the non-play areas of the yard. This would also help target resources by eliminating the need to evaluate soil or respond to contamination or hazards for properties where there is only a small amount of bare soil." (EPA, 2001)

Therefore persons conducting visual assessments for bare soil should make a rough calculation of the approximate area of bare soil in non-play areas and record that figure for use in determining whether additional soil coverings are necessary.

Visual assessors should always examine the bare soil within three feet of building walls (dripline). Research has found that soil in this area tends to have a higher concentration of lead than in other parts of the yard (NCHH, 2004).

F. Identifying Horizontal Surfaces that Are Not Smooth and Cleanable (Optional)

In homes with dust-lead hazards, it is often difficult to adequately clean rough or pitted surfaces that are accessible to children so that they are free of dust hazards and so the surfaces will achieve clearance after cleaning by licensed contractors or workers trained in the use of lead-safe work practices. Contaminated dust lodges in cracks and crevices in floors, interior window sills, or window troughs, and then is picked up in wipe samples that are analyzed by laboratories.

Therefore owners may want to prevent this problem by asking people performing visual assessments to identify surfaces that are likely to be difficult to clean, so that they can be repaired or coated with a sealant. Alternatively, owners can wait and see if there is a clearance failure and, if so, then repair the surface so that it is smooth and cleanable.

III. Ongoing Lead-Safe Maintenance Practices

This section describes methods of performing maintenance jobs in a lead-safe manner.

A. Introduction

With traditional building maintenance practices, disturbance of surfaces with lead-based paint can turn a potential problem into an immediate hazard. However, if maintenance practices are modified to provide sufficient lead-based paint protection to residents, workers, and the environment, lead hazards associated with maintenance and renovation work can be controlled.

To illustrate the importance of protective measures, even for small-scale jobs, consider how much lead is contained within a 1 square foot area that is painted with lead-based paint at the Federal regulatory definition of 1 mg/cm². To do this, convert centimeters (cm) to inches, and then inches to feet (ft), and then milligrams (mg) to micrograms (µg):

1 mg/cm² * (2.54 cm/inch)² * (12 inches/ft)² * 1,000 µg/mg = 929,000 µg/ft²

The 1 ft² painted area with lead-based paint at the Federal regulatory definition of 1 mg/cm², will have 929,000 µg of lead (almost a gram of lead). In the extreme case of all of this lead being turned into dust (as might happen with machine sanding)and none of the dust being collected by a filter, but being distributed evenly over the floor in a room measuring 10 feet x 10 feet (100 square feet, or 100 ft²), then there would be:

929,000 µg/ft² / 100 ft² = 9,290 µg/ft²

of lead on the floor. This number is compared to the EPA floor-dust lead hazard standard and floor clearance standard of 40 µg/ft². (Another way of looking at this is that the lead from just a ½ inch circle of paint that meets the lead-based paint definition would, if spread evenly over the 10 foot x 10 foot room would create lead dust at the dust-lead hazard threshold throughout the room.) Therefore, a significant amount of leaded dust can be released from even a small painted area. Even though most maintenance jobs would not turn *all* the lead-based paint into leaded-dust, it should be clear that large amounts of lead-contaminated dust can be generated from even low concentrations of lead-based paint or conversion of even small fractions of the paint into dust.

Lead-safe work practices and thorough clean-up are essential even for small-scale jobs. That is why these *Guidelines* recommend them even for jobs for which HUD and EPA regulations do not require them. Workers should never use the prohibited paint-removal practices described in Section III.C.1, below. In addition, when working in dwelling units or common areas frequented by children under age 6, workers should keep residents and pets out of the work area and should thoroughly clean the work area before letting them enter.

B. Ways in Which Maintenance Work Can Create or Intensify Lead Hazards

1. Paint Abrasion or Other Disturbance

The most common problem with traditional maintenance practices is that lead dust may be created when paint is disturbed. Common activities, such as sanding, scraping, sawing, hammering, or grinding on surfaces coated with lead-based paint can create large amounts of lead-contaminated dust, which may be hazardous for both workers and residents, especially

young children. Torch cutting or welding on painted metal surfaces is especially dangerous to workers and is prohibited under OSHA regulations (the paint must be removed before torch cutting or welding). Although most individual maintenance jobs do not last very long, it is possible to cause a significant exposure for the worker and create hazards for occupants. For example, power sanding on surfaces with lead-based paint has been found to cause worker exposures as high as 11,000 µg/m³ (Lange, 2000), which is well above the OSHA permissible exposure limit (PEL) of 50 µg/m³. Worker exposures associated with manual sanding, along with manual scraping, without control measures may also exceed the OSHA PEL, and may exceed 500 µg/m³ (Zhu, 2012), OSHA's assumed highest concentration generated by manual sanding (29 CFR 1926.62(d)(2)(i)(A)) and the maximum concentration for which half-faced HEPA-filtered air purifying respirator may be used. Other typical tasks, such as carpet removal, have also been shown to result in worker exposures well above the OSHA PEL, depending on how long the exposures last (NIOSH, 1990; EPA, 1997b; EPA, 1999a). Exposures can be kept well below the limit if the work is carefully conducted (NIOSH, 1990).

2. Water Damage

Water damage can occur from sudden circumstances, such as bursting pipes, overflowing tubs and sinks, broken fixtures, or storm damage. Water damage can also occur from less obvious problems, such as condensation, slow leaks in pipes or fixtures, roof failure, improper building drainage around the perimeter of the building, or accidental resident misuse (e.g., leaving the windows open during a rain storm). All of these situations can lead to paint failure, either by deterioration of the paint itself, or deterioration of the painted substrate. If only the source of the water leak is repaired, as in an emergency situation, the paint deterioration may not be evident until several weeks following the water leak repair and it may be left to the resident to repaint. If lead-based paint is known or presumed to be present, however, the paint should also be repaired as quickly as possible, after the surface has dried and the substrate has been repaired, using lead-safe work practices as stated in Section C.1.

3. Dust Exposures

Many types of maintenance work can release substantial quantities of dust into the residence. Examples include preparing surfaces for repainting, floor sanding, window repair (window troughs often contain very high levels of leaded dust), and plastering. Traditional maintenance practices employ the use of drop cloths and cardboard or newspapers to protect furniture, eating surfaces, and walkways. If the drop cloths become full of leaded dust and are used again, they may contaminate the next worksite. Poorly-controlled dust during maintenance work has accounted for numerous cases of childhood lead-poisoning (Farfel and Chisolm, 1990; Amitai, 1991; Rabinowitz, 1985a; Shannon, 1992; EPA, 1999b).

Lead-contaminated dust exposures to workers and residents can be controlled by the following:

- **Using wet methods** when sanding, scraping, or sweeping.
- **Covering floors and furnishings** with disposable and impermeable protective sheeting such as polyethylene.

- **Using foot coverings,** dedicated footwear and walk-off mats to minimize tracking leaded-dust out of the work area.
- **Sealing rooms** to avoid contamination of adjacent areas.
- **Using approved respirators**.

4. Grounds Keeping

If the soil is contaminated, certain grounds keeping activities can pose a risk to workers and occupants. Excavation to lay new pipes, regrading, and sodding disturbs the soil. Bare soil can be more easily tracked or blown into dwellings where it becomes part of the house dust and where a child can become exposed to it. If the soil is known or presumed to contain high concentrations of lead, simple protective measures can be introduced to control the spread of dust from ground keeping activities. Keeping the soil wet is usually effective, if proper erosion control measures are established. Disposable shoe coverings or dedicated work shoes will, if used properly, prevent tracking contaminated soil into dwellings, workers' automobiles, and maintenance shops.

C. Elements of an Ongoing Lead-Safe Maintenance Program

The basic elements of ongoing lead-safe maintenance are as follows:

1. Incorporate Lead-Safe Work Practices in All Paint-Disturbing Work

"Lead-safe work practices" are ways to perform paint-disturbing work (repairs, maintenance, rehabilitation, renovation, or remodeling) so that occupants and workers are protected from exposure to lead in dust and debris generated by the work and so that the environment is not contaminated. Owners should incorporate lead-safe work practices into all maintenance, renovation, or repair work that disturbs paint, and require that they be conducted by appropriately trained and, as applicable, certified workers. Lead-safe work practices include the following:

- **Work with adequate amounts of water.** Keep the surface wet with a water mist, except near electrical outlets and fixtures, so sanding, scraping, planing, etc. generate less dust and the dust that is created is controlled.
- **Protect occupants and prepare the worksite.** The worksite should be delineated and set up before work begins. Occupants should be protected. Guidance on worksite set-up and occupant protection is provided in Chapter 8. This guidance varies with the amount of dust likely to be generated by the work.
  - Generally, occupants should not be allowed in the work area until after the work is finished and the area is cleaned and cleared. Temporary relocation may be necessary. Personal belongings should be moved from the area when possible, or cleaned, covered and sealed. Floors of the work area (and, for high-dust jobs, passageways used by workers) should be protected with disposable, impermeable protective sheeting (such as heavy-duty polyethylene). Workers should not track dust from the work area to the rest of the dwelling.

— For high-dust jobs, dust should be contained within the room or rooms in which work is conducted by installing protective sheeting over doors and temporarily turning off the HVAC system for the work area and covering HVAC vents.

- **Specialized cleaning.** For jobs lasting more than a day, daily clean-up is recommended. When the work is completed, the worksite should be thoroughly cleaned, preferably with a HEPA vacuum and wet wash, to assure that the site is free of dust-lead hazards and can achieve clearance. Guidance on cleaning is provided in Chapter 14. Generally, final clean-up includes cleaning and removal of protective sheeting, and vacuuming and wet washing all horizontal surfaces in the work area, adjoining spaces and passageways used by workers, including floors, interior window sills, and window troughs. The area to be cleaned depends on the amount of dust generated by the job.

- **Do not use the following paint removal practices except as specified.** Workers should *not* use the following paint removal methods in HUD-assisted housing; the methods numbered 6 and 7 are permitted in unassisted housing:

  1. **Open-flame burning or torching.** This can produce toxic gases that a HEPA filter cartridge on a respirator cannot trap (a second, organic, filter is necessary). This method can create high levels of toxic dust that are extremely difficult to clean up; and it can burn down a house.

  2. **Operating a heat gun at surface temperatures at or above 1100 degrees Fahrenheit**. Operating heat guns at such high temperatures can release lead dust and fumes and induce large increases in the blood lead levels of young children (Farfel and Chisolm, 1990; also cited by EPA in the preamble to its final rule on Requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities. 61 *FR* 45777, August 29, 1996, *at* 45795.)

  3. **Machine sanding or grinding without a HEPA local exhaust control and a shroud.** Machine sanding or grinding with both a HEPA local exhaust control attached to the tool, and a shroud that meets the following performance requirement is permissible. The shroud must surround the surface being contacted by the tool with a barrier that prevents dust from flying out around the perimeter of the machine, *and* attached to a HEPA vacuum. However, this work method should be conducted used only by workers trained in its use. Because some dust may still blow out around the perimeter of the machine, workers near the machine should wear half-face respirators (with N100 cartridge) at a minimum. Also, the work area should be completely isolated if the machine is used inside.

  4. **Abrasive blasting or sandblasting without HEPA local exhaust control.** These methods should be used only within an enclosure that contains the spread of dust, chips, and debris, and that has a HEPA exhaust. This work method should be conducted used only by workers trained in its use.

  5. **Uncontained hydroblasting.** Removal of paint using this method can spread paint chips, dust, and debris beyond the work area containment. Contained pressure washing at less than 5,000 pounds per square inch (PSI) can be done within a protective enclosure to prevent the spread of paint chips, dust, and debris. Water run-off should also be contained. Because this method requires precautions that

are beyond the scope of most courses in lead-safe work practices, it should only be used by certified lead abatement workers under the supervision of a certified abatement supervisor.

6. **Manual dry sanding or dry scraping**, except that dry scraping is acceptable in conjunction with heat guns with surface temperature of less than 1100°F, or within one foot of electrical outlets, or when treating defective paint spots totaling no more than 2 square feet in any one interior room or 20 square feet on exterior surfaces.

7. **Paint stripping in a poorly ventilated space when using a volatile stripper that is a hazardous substance** in accordance with regulations of the Consumer Product Safety Commission (CPSC) at 16 CFR 1500.3(b)(4) and/or a hazardous chemical in accordance with the OSHA regulations at 29 CFR 1910.1059 (Methylene Chloride), as applicable to the work. (This practice is prohibited by HUD (24 CFR 35.140(f)) regarding work on HUD-assisted housing, but is not explicitly prohibited by EPA regulations.) OSHA's Respiratory Protection regulation (29 CFR 1910.134) may also apply when working in a space without adequate ventilation, as could the other OSHA personal protective equipment standards.

   Paint strippers with methylene chloride should be avoided. OSHA has found that adults exposed to methylene chloride "are at increased risk of developing cancer, adverse effects on the heart, central nervous system and liver, and skin or eye irritation. Exposure may occur through inhalation, by absorption through the skin, or though contact with the skin." ("Occupational Exposure to Methylene Chloride; Final Rule," 62 *FR* 1493, January 10, 1997). It is especially important that people who use paint strippers frequently not use them in a poorly ventilated area. CPSC and EPA recommend that people who strip paint provide ventilation by opening all doors and windows and making sure there is fresh air movement throughout the room ("What You Should Know About Using Paint Strippers," CPSC Document #423, and EPA Document EPA 747-F-95-002) (***www.cpsc.gov/cpscpub/pubs/423.html***). OSHA's permissible exposure limit for methylene chloride in air was reduced in 1997 from 500 to 25 parts per million (29 CFR 1910.1052 for general industry, and the identical 29 CFR 1926.1152 for construction). Methylene chloride cannot be detected by odor at the permissible exposure limit, and negative-pressure respirators with organic vapor cartridges are generally ineffective for personal protection against it. OSHA's regulation for Methylene Chloride, 29 CFR 1910.1052(g) covers respiratory protection.

- Alternative paint strippers may be safer but have their own safety and/or health concerns, so all paint strippers must be used carefully. Always follow precautions provided by the manufacturer. Waste and debris from the job should be wrapped or bagged, and sealed and properly disposed of as described in Chapter 10.

Lead-safe work practices are not required by EPA and HUD regulations if: (1) the paint being disturbed is not lead-based paint according to the Federal regulations; and (2) the total amount of paint disturbed by the work is no more than the applicable very small amount (the *de minimis* amounts, or the minor repair and maintenance activities amounts, described in section II.C.3, for work covered by the HUD Lead Safe Housing Rule or the EPA RRP Rule, respectively.). However, as explained above and in sections II.C.3 and III.A, these *Guidelines* recommend certain minimal safe work practices even if Federal regulations do not require them.

2. Stabilize Deteriorated Paint

Owners should stabilize all deteriorated paint that is known or presumed to be lead-based, or address the problem otherwise, such as through component replacement, or abatement of the deteriorated paint. Paint stabilization includes repair of conditions that may be contributing to the paint deterioration (such as deterioration of or damage to the building component, or malfunctioning doors and windows causing friction or impact) as well as surface preparation, and repainting. Stabilization may also involve repair of any exterior and interior water leaks that are causing paint deterioration and repair or replacement of rotted components, defective plaster, loose wallpaper, and missing door hardware needed to eliminate impact damage. Prepare the surface using wet methods. When removing paint, do not use prohibited practices listed in section III.C.1, above. Clean and, if necessary, degloss surfaces before repainting. Select and apply primer and topcoat according to the manufacturer's instructions. Clean-up the area thoroughly after the work. Detailed guidance on methods of paint stabilization is provided in section III of Chapter 11. Section IV of Chapter 11 provides guidance on treatment of friction, impact, and chewable surfaces.

3. Repair Failed Lead Hazard Controls

Owners should repair or replace any previous lead-based paint hazard control treatments that are no longer performing as designed. Encapsulations may become loose from the substrate. Wall paneling or siding may be damaged and no longer completely enclose a surface with lead-based paint. Coverings of lead-based paint on floors and stairs may become worn or loose. Ground covers may die, erode, or become worn, loose or damaged, exposing bare soil that is known to be a hazard. Guidance on encapsulation is provided in Chapter 13, specifically recommending a patch test to confirm that an encapsulant is compatible with a particular substrate. Methods of enclosing lead-based paint are explained in Chapter 12 (for abatement methods such as installing wallboard or paneling or exterior siding) and Chapter 11 (for interim control methods such as installing aluminum coil stock, or covering floors and stair treads). Chapter 11 also provides guidance on interim treatments of window friction surfaces, and coverings of bare soil. Note that failure of a lead hazard control may indicate that a different treatment should be used. See section I.A of Chapter 11 for a discussion of conditions in which some interim controls are likely to be ineffective.

4. Clean-up Dust and Debris

Upon completion of a paint-disturbing maintenance, repair, or renovation job, workers should thoroughly clean the work area, adjoining spaces, and any passageways used to access the work area. The area to be cleaned depends whether the job is considered high- or low-dust. See Chapters 8 and 14.

On a continuing basis, dwelling units and common areas should be kept free of obvious accumulations of dust and paint-related debris that exceed normal housekeeping standards. In rental properties, the owner should call potentially hazardous dust and debris to the attention of the tenant if cleaning is the resident's responsibility. All units should be cleaned at turnover, and window troughs should be cleaned at that time.

5. Control Chewable Surfaces

In spaces frequented by children under age 6, chewable surfaces with evidence of teeth marks should be covered with a puncture-resistant material, or the paint should be removed and the surface repainted. Two options for covering are aluminum coil stock or a hard, puncture-resistant encapsulant. Section IV of Chapter 11 provides guidance on covering chewable surfaces. Paint removal methods are discussed in Chapter 12.

6. Make Surfaces Smooth and Cleanable (Optional)

Horizontal surfaces (such as floors, stair treads, interior window sills, and window troughs) that are rough, cracked, pitted or porous should be made smooth and easily cleanable by covering or coating them with an appropriate material such as metal coil stock, polyurethane, sheet vinyl, or linoleum.

7. Inform Residents About Lead-Based Paint Hazards and Request Their Cooperation

Owners should inform residents about lead-based paint hazards so they will comply with occupant protection measures, such as staying out of work areas, respecting dust-containment installations, informing the landlord of deteriorated paint, keeping their units clean, and avoiding excessively long hot showers in inadequately ventilated bathrooms. The EPA's Pre-Renovation Education (PRE) rule, as amended by the EPA's Renovation, Repair, and Painting (RRP) Rule, requires persons performing, for compensation, any kind of renovation activity that is more than the minor repair and maintenance activities threshold described in Section II.C.3, above to provide a lead-information pamphlet to owners and residents prior to beginning work (40 CFR Part 745, subpart E). Detailed information on this informational requirement can be found at ***http://www.epa.gov/lead/pubs/leadrenf.htm***.

In housing receiving HUD assistance that is covered by the Lead Safe Housing Rule, the occupants must be notified within 15 days of the results of a lead evaluation or the presumption that lead-based paint or lead-based paint hazards are present, and within 15 days of results of lead hazard control activities (including clearance examination results and where any lead-based paint remains in the work areas) after the work is completed.

8. Perform Clearance Examinations to Check Dust-Lead Levels

HUD recommends that clearance examinations be performed after completion of maintenance and renovation work and associated clean-up when work exceeds the *de minimis* level, and requires this for housing receiving Federal assistance. EPA requires clearance after abatement projects, but not after other work. A clearance examination consists of a visual assessment for deteriorated paint, dust and debris; taking samples of dust on horizontal surfaces (floors, interior window sills, and window troughs); and testing the samples for lead. Clearance examiners should wait a minimum of one hour after the final clean-up of the work before collecting wipe samples of dust. Testing should be done by a laboratory recognized by EPA for analysis of lead in wipe samples. Workers and supervisors should not know where the wipe samples will be taken. Clearance should be performed by a person certified to perform clearance examinations in the State or Tribal area (usually a risk assessor, a lead-based paint inspector, or a sampling

technician). Clearance procedures are described in Chapter 15 and/or ASTM 2271, "Standard Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Single-Family Dwellings and Child-Occupied Facilities." (***www.astm.org/Standard/index.shtml***)

HUD does not require clearance in housing receiving Federal assistance if the area of paint disturbed by the work is no more than HUD's *de minimis* level defined at section II.C.3. For housing not covered by HUD's Lead Safe Housing Rule, these *Guidelines* recommend that, as a quality control check on their training and the project supervision, clearance examinations, including dust sampling, be conducted after maintenance jobs exceeding the *de minimis* level if the work is performed by newly trained workers, until three consecutive clearances of their jobs are passed on initial examination (i.e., on the first try), even if clearance is not required by regulation. Project supervisors (whether they are certified renovators or abatement supervisors) should always conduct a visual assessment of the work area, adjacent rooms, and passageways used by workers to determine that the clean-up, as well as the maintenance work, has been done properly; this visual assessment is required by HUD for work exceeding its *de minimis* level, and by EPA for renovation, repair, or painting work exceeding its minor repair and maintenance activities level (section II.C.3, and 40 CFR 745.83) and for all abatement work (Chapter 12, and 40 CFR 745.227(e)(8)(i)).

9. Addressing Bare Soil and Sandboxes

If the conditions described above in section II.E apply, all bare soil should be covered (see Figure 6.4). See section VI of Chapter 11 for guidance on soil-hazard controls.

If there is a sandbox containing sand that has not been tested for lead, the owner should:

- Test the sand and, if it is a hazard, replace it with sand with lead content of less than 200 µg/g if possible (this is best practice) but certainly less than 400 µg/g, which is the EPA requirement;
- Omit testing and replace the sand with new sand with the same lead content as in option (a); or
- Remove the sandbox and the sand.

FIGURE 6.4 Bare soil in Figure 6.3 covered with mulch (the window was sealed during the process of controlling the bare soil).

D. Qualifications of Firms, Workers, and Clearance Examiners

Workers performing lead-safe maintenance and lead-safe renovation must be supervised by a certified renovator working for a certified renovation firm if the amount of paint being disturbed is above the EPA's minor repair and maintenance activities threshold. If the housing is receiving federal housing assistance, the workers need to be certified renovators

themselves, and be supervised by a certified renovator working for a certified renovation firm if the amount of paint being disturbed is above HUD's *de minimis* threshold. See section IV.C.2, below, for information on training courses.)

Note that an owner of rental property working on a rental unit must establish a renovation firm that is certified by the EPA or the State, as applicable. Only an owner working on the housing unit in which only she and, if applicable, her family, but no other tenants, live is exempt from this firm certification requirement. (See Section II.C.3, above, about the thresholds.)

Persons performing clearance examinations must be certified by EPA or an EPA-authorized State, Tribe, or Territory (as applicable) as a risk assessor, a lead-based paint inspector, or a sampling technician, as allowed.

IV. Managing Ongoing Lead-Safe Maintenance

This section describes how an ongoing lead-safe maintenance program can be developed and managed. For multi-family housing, the lead-safe maintenance program should be included in the Lead Hazard Control Plan discussed in Chapter 11 (see Section II.A of that chapter).

A. Determining the Scope of the Program

At the outset, the owner should determine in writing exactly what the scope of the program is for the property in question. Some objectives are common to all properties, but there are several variations and options that are determined by Governmental regulation and the choice of the owner.

All lead-safe maintenance programs should include periodic visual assessments to identify deteriorated paint, paint-related debris, and excessive visible dust. All programs should also take steps to correct identified problems to the extent that they are the responsibility of the owner, and should use lead-safe work practices in doing so. All programs should also use lead-safe work practices when making any other paint-disturbing repairs and renovations. Clearance examinations should be included as required or otherwise appropriate. Finally, all programs should include communications with residents about lead-based paint hazards, including complying with the EPA Pre-Renovation Education Rule, and seeking residents' cooperation in cleaning their units frequently to keep dust accumulation to a minimum and reporting occurrences of paint deterioration, failed lead hazard controls (if applicable), and bare soil (if applicable) so that owners can promptly correct situations that are or may be lead-based paint hazards.

It should also be remembered that the HUD-EPA Lead Disclosure Rule must be observed. Owners of pre-1978 rental properties that are covered by that Rule must, among other requirements discussed in Appendix 6, provide the lead warning statement, and the EPA-approved pamphlet, and must disclose any actual knowledge, records and reports of lead-based paint and lead-based paint hazards to prospective tenants. Current tenants must be told of any new knowledge, records and reports at the time of lease renewal when lease conditions change. Disclosure to buyers prior to sale is also required; in addition to the requirements for rentals, sellers must provide an opportunity (typically 10 days) for the prospective buyer to conduct a lead-based paint inspection and/or risk assessment, and provide the buyer with the reports and records of lead-based paint and lead-based paint hazards.

Beyond these basic elements are a number of questions that owners or managers should answer in preparing to determine the scope and nature of their ongoing lead-safe maintenance program:

1. *Have lead-based paint hazards been identified through a risk assessment and, if so, have the hazards been controlled?* If hazards been identified but not yet controlled, they should be controlled promptly. If hazards have been controlled, the controls should be inspected during visual assessments and repaired if found to be failing.

2. *Do laws or regulations require that soil-lead hazards be controlled?* If so, visual assessments should include inspection of the grounds to identify bare soil, and bare soil should be covered according to guidance in this chapter and either Chapter 11 or 12. (If soil-lead hazard controls are in place, they should be identified in the answer to question 1, above.)

3. *Do laws or regulations require that floors, interior window sills, window troughs, or other horizontal surfaces be kept smooth and cleanable?* If yes, the condition of these surfaces should be visually assessed periodically and corrected if found to be rough and difficult to clean. If no, the owner may disregard the question of smooth and cleanable surfaces, or the owner may choose to maintain these surfaces in a smooth and cleanable condition.

4. *Do laws or regulations require that chewable surfaces be controlled?* If yes, the condition of these surfaces should be visually assessed periodically and corrected. If no, the owner may disregard the question of chewable surfaces, or the owner may choose to remove any lead-based paint from them.

5. *Do laws or regulations require that a clearance examination, including dust testing, be conducted after all paint-disturbing work, or that disturb more than a de minimis amount of paint?* If yes, a clearance examination must always be conducted. If no, clearance examinations should be conducted at the frequencies stated in section III.C.8, above.

6. *Do laws or regulations require that current residents be informed of the results of the clearance examination?* If yes, residents should be informed as soon as feasible, and within the required period. For example, for federally-assisted target housing, HUD requires tenant notification of hazard reduction activity within 15 days; see section III.C.7, above. If no, release of such information is at the option of the owner. For renovation, repair, or painting work in target housing that exceeds the EPA's minor repair and maintenance activities threshold, the renovation firm must, provide specific information about the test kit sampling or clearance examination within 30 days to the person who contracted for the renovation; EPA does not require notification of residents. Note, also , that new information on lead-based paint and lead-based paint hazards, such as clearance examination results, must be provided to current residents at the time of lease renewal under the HUD-EPA Lead Disclosure Rule (which applies to almost all pre-1978 housing).

7. *Do laws or regulations require only that ongoing lead-safe maintenance be carried out in dwelling units occupied by children under age 6, and common and exterior areas associated with those dwelling units?* If yes, lead-safe maintenance in other units is optional. This situation arises, for example, with:

   - HUD-assisted tenant-based rental assistance (under the housing choice voucher program), for which the Lead Safe Housing Rule applies only to dwelling units in target housing occupied or to be occupied by families or households that have one or more children of less than 6 years of age, common areas servicing such dwelling units, and exterior painted surfaces associated with such dwelling units or common areas. Common areas servicing a dwelling unit include those areas through which residents pass to gain access to the unit and other areas frequented by resident children of less than 6 years of age, including on-site play areas and child care facilities. (24 CFR 35.1200(b)(1))

- Some State and local jurisdictions require ongoing lead-safe maintenance in certain housing. For example, an owner of housing in Massachusetts who obtains a Letter of Interim Control must implement an ongoing lead-safe maintenance program (105 Code of Massachusetts Regulations 460.105(E), Maintenance and Monitoring). In New York City, rental housing "[o]wners must prevent the reasonably foreseeable occurrence of lead hazards and remediate them, and the underlying defects that may cause lead hazards, using safe work practices in apartments [and] in common areas." (Local Law 1 of 2004 – A Summary. Department of Housing Preservation and Development. City of New York. See also title 28 Rules of the City of New York § 11-02, Owner's Responsibility to Remediate, and § 11-04, Investigation for Lead-based Paint Hazards, ¶ (a).)

8. *Is lead-based paint known to be present?*
   The property owner or manager must presume that all paint is lead-based paint, and that all deteriorated paint is a lead-based paint hazard until:

   - an inspection is conducted, or
   - chemical spot test kit testing determines that lead-based paint is absent on building components to be worked on under the RRP Rule.

   If an inspection was conducted and no lead-based paint was found, the property is exempt from federal lead-based paint regulations, and lead-safe maintenance is not necessary, although the precautions recommended at the conclusion of section I of this chapter, and in section II.C.3, should be observed.

   If an inspection was conducted and lead-based paint was found, has it been removed?

   - If the lead-based paint has been removed, the property may be exempt from the federal lead-based paint regulations. See Appendix 6 for regulatory requirements before the property can be considered to be exempt.
   - If the paint has not been removed, lead-safe maintenance procedures need to continue, focused on the remaining surfaces with known or presumed lead-based paint. (See Chapter 7 for how to extend the knowledge of lead-based paint status from surfaces that were sampled to surfaces that were not sampled).

B. Assignment of Responsibilities

Owners or managers should assign each of the following ongoing lead-safe maintenance responsibilities to a specific individual and should describe the responsibilities in writing. Based on the size of the organization responsible for maintaining the property (including staff and, possibly, maintenance supervision contractors), and the skill, knowledge, training and experience of the personnel involved, an individual may have one or more than one area of responsibility.

- **Managing visual assessments**, which includes assuring that visual assessments are performed at all units, areas, and surfaces at the recommended frequency; determining what items should be looked for in visual assessments; ensuring that persons performing visual assessments are trained in identifying deteriorated paint and other items to be observed, and that they know how to record on Form 6.0 or similar form all observations made during the visual assessments.
- **Ensuring that workers performing paint-disturbing work are working safely and in a lead-safe manner.** This includes ensuring that workers are following OSHA requirements (or the State

occupational safety and health requirements, if applicable) and are using lead-safe work practices in which they have been trained by becoming certified renovators or, in HUD-assisted housing, becoming certified lead-based paint abatement workers or supervisors, or being supervised by a certified lead-based paint abatement supervisor; or, in unassisted housing, being supervised by a certified renovator who has provided them with project-specific on-the-job training in lead-safe work practices. Employers are responsible for instituting engineering and work practice controls including administrative controls to the extent feasible to reduce employee exposure to lead. If those controls are feasible but not adequate to reduce exposures below OSHA's permissible exposure limit for lead, they must be supplemented with (not replaced by) appropriate respiratory protection. (See OSHA's lead in construction standard, 29 CFR 1926.62, OSHA's summary of the standard at its appendix B; and Chapter 9 and Appendix 6 of these *Guidelines*.)

- **Maintaining records** on the existence of lead-based paint and lead hazard controls, and on the performance of lead-safe maintenance, including visual assessment records and records of completion of maintenance and renovation work and clearance examinations. If the work is done by employees of the owner or manager, maintaining records in accordance with the OSHA lead in construction standard (29 CFR 1926.62(n)). (See Chapter 9 and Appendix 6 of these *Guidelines*.)

- **Determining exactly what lead-safe work practices should be used on each paint-disturbing job**, which includes determining whether the specific job will disturb paint that is known or presumed to be lead-based, whether the job will be a low-dust or high-dust job, and what occupant protection and worksite preparation methods are appropriate to the job. (See chapters 8 and 11 of these *Guidelines*.)

- **Modifying the work order system** to include necessary information for the maintenance workers on lead-safe work practices for each job.

- **Handling communications with residents**, including compliance with the EPA Pre-Renovation Education rule (PRE), and HUD's Lead Safe Housing Rule, and notifying residents of the results of environmental testing before work is begun (if any), the results of lead hazard controls (if any), and the results of clearance dust testing and cleaning verification.

FIGURE 6.5 Unit turnover is an excellent time to conduct the visual assessment and perform lead-safe maintenance activities.

- **Purchasing and maintaining supplies and equipment**, including lead information pamphlets, respirators, protective sheeting, workplace barrier tape, high-quality vacuums (preferably HEPA), disposable shoe coverings, protective clothing, and cleaning equipment.

- **Monitoring the work and managing clearance**, including inspecting ongoing work for lead-safe work practices, inspecting jobs after clean-up, and arranging for clearance examinations.

For small staffs, a single person may handle all of these tasks; for larger staffs, coordination is essential. If there is only a single maintenance person and owner/supervisor, a written program may not be essential, but it is quite useful as a reminder of what needs to be done (see Figure 6.5).

C. Description of Responsibilities

1. Managing Visual Assessments

The main objectives of managing visual assessments are to assure that visual assessments are performed at all dwelling units, common areas, exterior painted surfaces and grounds (if required or recommended) at the frequency described in section II.A, above, and that persons performing visual assessments know what to look for in a given area and how to record their observations.

It is suggested that a list be made of all spaces (i.e., dwelling units, common areas, exterior surfaces) to which visual assessment for lead-safe maintenance applies at the subject property, and that the date of each visual assessment of each space on the list be recorded, including those made at turnover or during other maintenance visits. Then, at the end of a designated 12-month period, the list will reveal which spaces have not yet been visually assessed. Owners or managers should establish the policy that visual assessments be conducted at turnover and at the time of other maintenance visits whenever possible. An example of a simple form for this purpose is provided at Form 6.2 at the end of this chapter.

Owners or managers should assure that each person performing a visual assessment:

- **Has completed a recognized course on visual assessment of deteriorated paint,** such as HUD's online course (at ***http://www.hud.gov/offices/lead/training/visualassessment/h00101.htm***.) or a similar State course, or an EPA-, State- or Tribally-accredited lead-based paint inspection or risk assessment course.
- **Knows how much visible dust and paint-related debris is considered excessive**.
- **Knows whether the area in question has lead hazard controls in place** and, if so, what and where, and what constitutes failure.
- **Knows how to recognize structural or substrate problems** that may be causing paint deterioration or failure of hazard controls.
- **Knows whether to look for bare soil**, and if so, where, how to distinguish between play areas and the rest of the yard, how to determine if the total area of bare soil in the rest of the yard exceeds HUD's small amount threshold (9 square feet per property), and if the bare soil is contaminated with dust, paint chips and/or debris.
- **Knows whether to look for other optional conditions that the owner may wish to include in the visual assessment**, such as whether floors, interior window sills and window troughs are smooth and cleanable, or whether there are chewable surfaces.
- **Knows how to record observations** on forms or worksheets provided for the purpose.

2. Determining that Firms and Workers Are Qualified

Property owners and managers of target housing must ensure that the maintenance firms and workers conducting work covered by the EPA's Renovation, Repair, and Painting (RRP) Rule (see Appendix 6) are certified renovation firms which have the work supervised by certified renovators and the workers either certified renovators or property trained under the RRP Rule, as described in Section III.D, above.

3. Maintaining Records

The owner or manager should keep the following forms (all located at the end of the chapter) or reports to facilitate and document the lead-safe maintenance program:

- **Reports of visual assessments** (Forms 6.0 and 6.1, or similar forms).
- **A log of the dates of visual assessments** (Form 6.2, or similar form).
- **An inventory of lead-based paint testing results or presumption of lead-based paint or hazards**, if any (Form 6.3, or similar).
- **An inventory of lead hazard controls**, if any (Form 6.4, or similar).
- **Lead-safe maintenance work orders**, if used (Form 6.5, or similar).
- **Reports of clearance examinations**.

Inventory of lead-based paint testing. Individuals assigning maintenance tasks will need to determine whether work on certain surfaces may result in a lead hazard. The best method for doing this is to have a certified lead-based paint inspector or risk assessor determine whether lead-based paint is present (using the protocols in Chapter 7) and then maintain an easy-to-use, surface-by-surface inventory, such as that shown as Form 6.3 at the end of this chapter and illustrated by example in Form 6.3a. If paint testing is not conducted, all painted surfaces in dwellings constructed before 1978 should be presumed to contain lead-based paint, until proven otherwise. While this presumption could result in erroneously requiring controls for working on paint that does not contain lead, it would be dangerous to assume that the paint does not contain lead. A maintenance supervisor could fail to recommend controls where they are needed, resulting in a poisoned worker or child.

It is important to note that most painted surfaces in dwellings constructed before 1978 do *not* contain lead-based paint. This is especially true of buildings constructed after World War II (Jacobs, 2002). It is not unusual for entire buildings built in the 1970s to have no lead-based paint. Therefore, it frequently pays to test. The cost of testing can be returned in reduced maintenance and renovation costs. Also, if it is *known*, through *document*ation, that certain building components are new or were replaced or new materials added after 1977, it can be assumed that they do not contain lead. For example, if all exterior doors and windows in a building are known to have been replaced in 1981, these surfaces do not need to be included in the inventory of components known or presumed to contain lead-based paint. It is advisable, however, to have written documentation of the dates such additions or replacements. Reuse or reinstallation of old or antique architectural components should also be avoided.

Depending on the size and organization of the maintenance operation, the inventory could be organized by room (appropriate for small owners with only one or a few single-family dwellings) or by unit/apartment building (appropriate for larger landlords). For computerized maintenance systems, the lead-based paint inventory system can be added to the database to flag those jobs that could produce lead hazards. If workers or supervisors are unsure about whether or not they are working on a leaded surface, they can quickly consult the inventory.

Inventory of lead hazard controls. If lead hazard controls, other than *de minimis* paint stabilization or total removal of the lead-based paint, have been conducted on the property, it will be necessary to inform the visual assessor of their existence. Therefore, it is recommended that owners maintain a simple inventory of lead hazard controls that lists the location, type of hazard, method of control, and date of installation. Form 6.4 provides an example of such an inventory form.

4. Determining the Lead-Safe Work Practices To Be Used on Each Job

The methods used to protect residents, workers, and the environment on a given maintenance or renovation job depend on many factors, including the amount and dispersal of dust likely to be created by the job (which in turn is affected by the size of the surface(s) needing work, the nature of the work, and the methods being used); the location of residents; the building layout; and the proximity of the building to other properties. Consult Chapter 8 for guidance on determining whether a job is likely to generate low or high amounts of dust and on selecting occupant protection and worksite preparation methods appropriate to the job. Absent other comprehensive training on this subject (see courses described above in section IV.C.2), Chapter 8 is essential to understanding lead-safe maintenance. Also, Chapter 11 (Interim Controls) should be consulted for work practices to be used in various types of paint-disturbing work (such as paint stabilization or repair of windows or doors), and Chapter 9 provides further information on worker protection.

5. Modifying the Work Order System

Work order systems should be modified (if they have not yet been) to reflect whether the job will disturb lead-based paint, whether the job is low- or high-risk (see guidance in Chapter 8), and which protective measures will be required. Even if an owner does not have a formal work order system developed, the hazard warning information must be transmitted to those conducting the work.

To account for lead hazards, the owner's work order form will need to be modified (if it has not yet been). Specifically, a check-off box should be added to indicate that the work will disturb known or presumed lead-based paint. If this box is checked, the supervisor or worker should receive a second form (see Form 6.5 "Lead-Safe Maintenance Work Order" at the end of this chapter) with detailed information on required work practices and control measures.

6. Communicating with Residents

The EPA's Pre-Renovation Education Rule requires that persons who perform, for compensation, most renovation, repair or painting of housing built before 1978 provide, before beginning work to the owner of the housing, and to the occupant of each affected unit (a unit in which the work is being done, and/or a unit for which work in a common area that will affect that unit) (40 CFR 745.84):

- the renovation-specific pamphlet *"Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools,"* (***www.epa.gov/lead/pubs/renovaterightbrochure.pdf***, or, in Spanish, ***www.epa.gov/lead/pubs/renovaterightbrochuresp.pdf***) or an EPA-approved State or Tribal alternate pamphlet; and
- information about how and where the project will be conducted, including the general nature and locations of the planned renovation activities; the expected starting and ending dates; and
- if the work is being conducted in common areas, ensure written notification to each affected unit with the information above and describing how the occupant can obtain the pamphlet, at no charge, from the firm performing the renovation.

This pre-renovation education is not required for: (1) minor repair and maintenance activities (see section II.C.3, above), (2) emergency renovation operations, and (3) renovations in which a certified lead-based paint inspector, certified risk assessor, or the certified renovator for the project has determined that the components disrupted by the renovation are free of lead-based paint. Detailed information on implementing pre-renovation education is provided in the EPA's *Small Entity Compliance Guide to Renovate Right*, a handbook on the RRP rule for contractors, property managers and maintenance personnel working in homes and child-occupied facilities built before 1978 (EPA publication EPA-740-K-10-003; ***www.epa.gov/lead/pubs/sbcomplianceguide.pdf***).

7. Purchasing Supplies and Equipment

The following is a list of some of the more important specialized materials needed to carry out lead-safe maintenance. These items, with the possible exception of quality door mats, are available at most full-service hardware stores (see Figure 6.6).

A. Vacuum. If possible, a high-quality, high efficiency particulate air (HEPA) vacuum should be used in cleaning. If required by EPA, HEPA vacuums must be used. If construction work is being performed, OSHA's lead in construction regulation 29 CFR 1926.62(h)(4) requires HEPA vacuums for vacuuming. A HEPA vacuum has a filter capable of removing particles of 0.3 microns or larger from air at 99.97 percent or greater efficiency. The filters on ordinary vacuums do not capture very tiny particles of lead, allergens, and other contaminants but rather let them pass through the filter and out the exhaust. However, it is important to note that there is more to a vacuum than the filter. Other important factors that determine the effectiveness of a vacuum are suction (which is a function of the motor, the design of the suction tool, and the extent to which the rest of the system does not release air before it is supposed to), quality of construction (which may determine the durability of the machine and whether there are air pres-sure leaks before the filtration), and whether the vacuum has special tools, such as a beater bar or agitator attachment for carpets. Also, there are filters available that, while not HEPA, are better than those that formerly were standard on household and commercial vacuums.

Research has shown that high-quality non-HEPA vacuums are often as effective as, and sometimes more effective than, HEPA vacuums (California Department of Health Services, 2004; Rich, 2002; Yiin, 2002). Therefore, while these *Guidelines* recommend that a good HEPA vacuum should be used if possible, a high-quality household or commercial vacuum should be used if a HEPA vacuum is not available.

B. **Respirators.** Workers on high-dust jobs (see Chapter 8) should wear respirators that are rated N100 (HEPA) at a minimum. N100 rated disposable masks are available, but a fitted, half-face respirator is preferable because it is reusable and conforms to the face of the user, eliminating leaks. Disposable respirators can be $5 to $7, while a half-face respirator costs $32 plus $3 for set of cartridges. All determinations with regard to worker protection equipment, such as respirators and protective clothing, should be made in accordance with OSHA regulations for exposure monitoring and assessments. If dust levels are at or above OSHA's Permissible Exposure Limit, there are legal requirements under both 29 CFR 1910.1025 (Lead in General Industry) and 29 CFR 1926.62 (Lead in Construction) for personal protective equipment.

C. **Protective sheeting.** When lead-safe work practices are recommended, workers should use disposable, impermeable protective sheeting (such as heavy-duty polyethylene) as needed to cover floors, furniture, and HVAC ducts in the work area, construct dust-containing door flaps, and also to cover floors in passageways to and from the work area. Sheeting that is subject to the possibility of abrasion or puncture should be at least 6-mil thick, while other sheeting can be less thick.

D. **Protective clothing.** For high-dust jobs, it is recommended that workers either wear disposable protective suits (such as Tyvek™) or wear clothes that will be changed before leaving the work place and washed separately from the family laundry.

E. **Disposable shoe coverings.** An effective and relatively easy way to avoid tracking contaminated dust into non-work areas is for workers to wear inexpensive non-skid disposable shoe coverings when walking on protective sheeting and then remove the shoe coverings whenever they step off the protective sheeting.

F. **Detergents, buckets, mops and rags for wet cleaning the work area.** The supplies and equipment for wet cleaning the work area are all standard`, commonly used cleaning materials (see Figure 6.6). The detergent should be a common cleaning solution, not trisodium phosphate (TSP). Not only has TSP been banned in some areas because of negative effects on the ecology of aquatic systems, but also research indicates that phosphate content is not associated with effectiveness in removing lead-contaminated dust from residential surfaces (EPA, 1997a; EPA, 1998). When cleaning floors, workers should have three buckets: one for the cleaning solution, one with a mop-squeezing tool, and one with clean water for rinsing the floor. For floors, the mop should be a string mop; sponge mops work more as a sweeping tool since it has less surface area to trap dust than string mops. Rags and sponges are recommended for cleaning walls, interior window sills, window troughs, counters, shelves and other horizontal surfaces.

FIGURE 6.6 Clean-up supplies.

Some experienced contractors have abandoned mopping in favor of a "wet wipe and toss" procedure. This method requires a large quantity of clean rags, which are put into a bucket of detergent and water solution. The worker pulls a rag from the bucket, wrings it out over the bucket, wipes clean an area of about 16 square feet, throws the used rag away, pulls another rag, and so on. If the detergent requires rinsing, repeat with clean water. For sills, troughs, counters, shelves, walls, and tight floor spaces like behind toilets, the wet wipe and toss method is the best alternative to the mop. Some contractors prefer this method even for large floor areas. A major advantage is that it avoids the potential problem of re-contaminating the area by cleaning with dirty water. This method may also use less water than a mop. The rags are commercially available disposable cloth scraps or paper products. Cloth rags usually are not cleaned and reused because of the risk of contaminating other laundry (White, 2003).

G. Door mats. Lead dust from outside the building can be tracked inside on the bottom of shoes, wheels on carts, and bare feet. A good doormat can be very effective in reducing the introduction of exterior of dirt, dust, moisture, and various contaminants in residential and nonresidential buildings, *provided the mat is vacuumed frequently*. A good mat should have dense, synthetic fibers on a waterproof backing and should be easily cleaned by vacuuming. For best results, it should be placed in a dry location inside an exterior door, and, if possible, it should be big enough to allow people to take three or four steps on the mat. A small mat (e.g., two feet by three feet) is effective if people wipe their shoes on it. The better mats tend to be designed for commercial use and may not be available at hardware stores, except by special order.

8. Monitoring the Work and Arranging for Clearance Examinations

The person who monitors maintenance or remodeling work should be trained in lead-safe work practices and should be familiar with clearance examination procedures. There are three stages of involvement: (1) *while paint-disturbing work is underway*; (2) *during and after clean-up*; and (3) *at the time of clearance*.

The following is a minimal list of determinations that should be made while work is underway:

- ***Has the worksite been set up properly***, in accordance with the work order and guidance in Chapter 8, and does the setup appear to be working as planned?
- ***Are residents being kept out of the work area?***
- ***Are workers avoiding the use of prohibited work practices?***

- ***Is waste being handled correctly?***
- ***Are workers using worker protection methods appropriate to the job?***

Clean-ups should be observed in process on a random basis to assure that all horizontal surfaces are being cleaned, and every job should be inspected visually after clean-up to assure that no visible dust and debris are present in the work area and in other rooms and passageways used by the workers.

The person responsible for arranging for clearance should retain a person or firm certified to perform clearance examinations in the State. Multi-family property owners can use in-house staff to perform clearance, provided the clearance examiner is certified in the State or Tribal area and the clearance examiner does not participate in doing the maintenance or renovation work and the clean-up. Clearance should be conducted as required by regulation. Even if regulations do not require clearance, clearance examinations should be conducted randomly at a rate of at least one per twenty jobs for crews demonstrating a good record of achieving clearance on the first three tries. The timing of the clearance examination is important. Clearance dust sampling should be performed no less than one hour after clean-up has been completed to allow time for any fallout of fine dust particles. Arrangements must be made for the clearance examiner to have access to the worksite. Chapter 15 explains what a clearance examiner does and what the Federal dust-lead standards are for clearance.

On-site Dust Testing. Owners and managers should be aware that methods exist for reliably analyzing wipe samples on-site instead of in a fixed laboratory. These include portable X-ray fluorescence (XRF) analysis and anodic stripping voltammetry (ASV) (EPA, 2002b; Clark, 2002). These methods may provide testing results much more quickly than fixed-laboratory analysis because samples do not have to be transported to the laboratory. Therefore the methods may save time and money, reduce relocation difficulties, facilitate cooperation with tenants, and accelerate environmental investigations in cases of lead-poisoned children.

In States and Tribal lands where EPA is operating a lead program, wipe samples for a clearance examination must be analyzed by a laboratory or testing firm recognized by EPA under the National Lead Laboratory Accreditation Program (NLLAP). If, in these States, an NLLAP laboratory wishes to perform on-site analyses of dust wipe samples, they may do so. In States or Tribal lands where the State or Tribe is operating an EPA-authorized lead program, the same requirements generally apply, although there may be some differences (EPA, 2002a). While EPA regulations and procedures apply only to abatement activities, HUD regulations and many State regulations apply the same procedures to non-abatement activities.

In addition, any person who is trained and otherwise qualified to operate the XRF instrument or use the ASV method may use these methods to conduct *preliminary* dust testing to determine whether the clearance area is clean and ready for the clearance examination. A person conducting a preliminary screen does not have to be a technician working for an NLLAP-accredited laboratory. Owners and contractors may wish to use such screening tests to minimize the likelihood of clearance failure. State regulations on the use of devices with radioactive elements must be observed.

Form 5.2 Report of Visual Assessment (for Lead Hazard Risk Assessment).
Form 6.0 Report of Visual Assessment (for Ongoing Lead-Safe Maintenance).

Property address _____ Apt. No. _____Page ____ of ____

Name of property owner _____

Name of risk assessor _____ Date of assessment ____ /____ /____

Area Description		Deteriorated Paint			Friction or Impact Surface? (F or I)	Visible Teeth Marks? (Y or N)	Paint Testing Results (Use codes below)[4]	Notes [e.g., paint testing (e.g., XRF, lab analysis) indicates paint is or is not lead-based paint; cause(s) of hazard control failures]
Location of Building Component, Dust or Bare Soil	Building Component, Dust, or Bare Soil Play Area/ Non-Play Area	Area (sq. ft.)	Is Area Small?[2] (Y or N)	Probable Cause(s) of Deterioration if Known[3]				

[1] Include room equivalent or exterior side or wall, as appropriate.

[2] Lead-safe work practices and clearance/cleaning verification are not required if work does not disturb painted surfaces that total more than

- For assisted housing: HUD's *de minimis area* of: 20 ft² or less on exterior surfaces, 2 ft² or less in any one interior room or space, or 10 percent of the total surface area on an interior or exterior type of component with a small surface area (such as trim, window sills, baseboards);
- For unassisted housing, and for child-occupied facilities, EPA's minor repair and maintenance activities threshold of: 6 ft² or less per room; or 20 ft² or less for exterior activities; provided that no prohibited or restricted work practices were used and no window replacement or demolition of painted surface areas is to be done.

[3] Common causes of paint deterioration are: moisture (indicate source if apparent), mildew, friction or abrasion, impact, damaged or deteriorated substrate, and severe heat.

[4] Codes based on previous paint testing or lead-based paint (LBP) inspection: *Code 1*: Surface known to be LBP; *Code 2*: Surface known to be LBP; *Code 3*: Presumed to be LBP. If paint testing results are obtained on site, use this column to record the result. If a paint chip sample is sent to the laboratory, use this column to record the sample number (or other unique identifier) as a reference to another record containing the sampling data and laboratory results.

Form 6.1 Report of Visual Assessment of Bare Soil for Lead-Safe Maintenance

Property address _____

Name of visual assessor _____ Date _____

Type of Area (play or nonplay)	Location of Each Bare Soil Area (side of building and detailed description, or code from sketch plan)	Approximate Area of Bare Soil Area (in sq. ft. or approximate dimensions)	Notes

Site-Plan Sketch Showing Locations of Bare Soil

Form 6.2 Log of Visual Assessments for Ongoing Lead-Safe Maintenance

Property address _____

Unit Number, Common Area, or Exterior	Date of Visual Assessment and Initials of Assessor			

Form 6.3 Lead-Based Paint Inventory

Property address _____

_____

Dwelling Unit Number, Common Area, or Exterior Wall _____

Room Identifier _____

Room or Space	Component or Surface	Known Lead-Based Paint	Suspected Lead-Based Paint	Known Not To Be Lead-Based Paint

Indicate date of test that determined not lead-based paint

Form 6.3a Completed Lead-Based Paint Inventory for a Room/Space

Dwelling Unit Identifier 234

Room Identifier Dining Room

Surface	Known Lead-Based Paint	Suspected Lead-Based Paint	No Lead-Based Paint
Floors			**X** (6/3/2005)
Lower Walls		**X**	
Upper Walls		**X**	
Chair rail		**X**	
Interior window trim		**X**	
Window trough	**X**		
Ceiling		**X**	
Baseboards			**X** (6/3/2005)
Doors			**X** (4/15/2006)
Door trim		**X**	
Crown molding		**X**	
Other trim, mantels, etc.		**X**	
Exterior siding	**X**		

Form 6.4 Lead Hazard Control Inventory

Property address _____

Dwelling Unit, Common Area, or Exterior Location	Room/Component or, if exterior, Yard or Play Area	Description (Type of Hazard, Control Method, Date of Application or Installation)

Form 6.5 Lead-Safe Maintenance Work Order

Reference to work order number _____

Equipment and supplies needed (check items needed):

- ☐ Protective sheeting (e.g., polyethylene) Approximate amount (in yards) _____
- ☐ Disposable shoe coverings
- ☐ Protective clothing
- ☐ Respirators
- ☐ Vacuum (HEPA preferable, if available)
- ☐ Cleaning materials (detergent, buckets, mops, and rags)
- ☐ Spray bottle for misting
- ☐ Other _____

Worksite preparation (check items needed):

- ☐ Cover whole floor with protective sheeting
- ☐ Cover floor approximately five feet from work surface
- ☐ Cover floors in hallway to work area
- ☐ Cover furniture ☐ Move furniture
- ☐ Close off doorways(s) to room with protective sheeting
- ☐ Relocate occupants temporarily ☐ Just keep occupants out of work area
- ☐ Shut down HVAC system while paint-disturbing work is underway
- ☐ Other _____

Mist down paint surfaces to be disturbed *(except around electrical outlets)* ☐ Yes ☐ No

Clean-up:

Area(s) to be cleaned: _____

Vacuum horizontal surface? ☐ Yes ☐ No

Wet wash? ☐ Yes ☐ No

Clean window troughs? ☐ Yes ☐ No

Disposal of waste will be done by _____

Will clearance dust sampling be conducted ☐ Yes ☐ No

References

Amitai, 1991. Amitai, Y., M.J. Brown, J.W. Graef, and E. Cosgrove. "Residential Deleading: Effects on the Blood Lead Levels of Lead Poisoned Children," *Pediatrics 88(5)*: 893–897.

ASTM, E 2271. American Society for Testing and Materials, "Standard Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Single-Family Dwellings and Child-Occupied Facilities," ASTM, 100 Barr Harbor Drive, West Conshohocken, PA.

California Department of Health Services, 2004. Public Health Institute for California Department of Health Services, Childhood Lead Poisoning Prevention Branch and Environmental Health Laboratory Branch, "Evaluation of Household Vacuum Cleaners in the Removal of Settled Lead Dust from Hard Surface Floors," Final Report to U.S. Department of Housing and Urban Development, 2004.

Clark, 2002. Clark, C.S., "Development of a Rapid On-Site Method for the Analysis of Dust Wipes Using Field Portable X-Ray Fluorescence," prepared for the U.S. Department of Housing and Urban Development, January 2002.

EPA, 1997a. U.S. Environmental Protection Agency, *Laboratory Study of Lead-Cleaning Efficacy,* March 1997 (EPA 747-R-97-002). Available through ***nepis.epa.gov*** by searching for 747R97002.

EPA, 1997b. U.S. Environmental Protection Agency, *Lead Exposures Associated With Renovation and Remodeling Activities: Summary Report,* May 1997 (EPA 747-R-99-001). Available through ***nepis.epa.gov*** by searching for 747-R-99-001

EPA, 1998. U.S. Environmental Protection Agency, *Lead-Cleaning Efficacy Follow-Up Study,* October 1998 (EPA 747-R-98-008).

EPA, 1999a. U.S. Environmental Protection Agency, "Lead Exposures Associated With Renovation and Remodeling Activities: Phase IV, Worker Characterization and Blood-Lead Study of R&R Workers Who Specialize in Renovation of Old or Historic Homes," March 1999 (EPA 747-R-99-001).

EPA, 1999b. U.S. Environmental Protection Agency, "Lead Exposures Associated With Renovation and Remodeling Activities: Phase III, Wisconsin Childhood Blood-Lead Study," March 1999 (EPA 747-R-99-002).

EPA, 2001. U.S. Environmental Protection Agency, Identification of Dangerous Levels of Lead, 66 *Federal Register* 1206-1240, January 5, 2001; at 1227.

EPA, 2002a. U.S. Environmental Protection Agency, "Questions & Answers About ETV Reports on Portable Technologies for Measuring Lead in Dust," December 2002.

EPA, 2002b. U.S. Environmental Protection Agency, The Environmental Technology Verification Program (ETV), Verification Statements EPA-VS-SCM-50, 51, 52, 53 and 54. Prepared by Oak Ridge National Laboratory, Oak Ridge, Tennessee, August, 2002.

Farfel and Chisolm, 1990. Farfel, M., and J.J. Chisolm, Jr., "Health and Environmental Outcomes of Traditional and Modified Practices for Abatement of Residential Lead-Based Paint," *American Journal of Public Health 80:10,* 1240–1245. ***ajph.aphapublications.org/cgi/reprint/80/10/1240***

HUD, 2001a. *National Survey of Lead and Allergens in Housing, Final Report, Volume I: Analysis of Lead Hazards*, prepared by Westat, Inc. for U.S. Department of Housing and Urban Development, Washington, DC, April, 2001. ***http://www.nmic.org/nyccelp/documents/HUD_NSLAH_Vol1.pdf***

Lange, 2000. Lange, John H., K.W. Thomulka, "Effectiveness of Engineering Controls for Airborne Lead Exposure during Renovation/Demolition of a Commercial Building," *Indoor and Built Environment, 2000*:9, 207-215 (DOI: 10.1159/000057509).

Jacobs, 2002. Jacobs, D.E., R.P. Clickner, J.Y. Zhou, S.M. Viet, D.A. Marker, J.W. Rogers, D.C. Zeldin, P. Broene and W. Friedman, "The Prevalence of Lead-Based Paint Hazards in US Housing," *Environmental Health Perspectives, 110(10)*:599, October 2002. ***http://www.ncbi.nlm.nih.gov/pubmed/12361941***

NCHH, 2004. National Center for Healthy Housing, and University of Cincinnati Department of Environmental Health, *Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program: Final Report,* prepared for the U.S. Department of Housing and Urban Development, Washington, DC, May 1, 2004.

NIOSH, 1990. National Institute for Occupational Safety and Health, *Health Hazard Evaluation Report: HUD Lead Based Paint Abatement Demonstration Project,* HETA 90–070–2181.

Rabinowitz, 1985a. Rabinowitz, M., A. Leviton, and D. Bellinger, "Home Refinishing, Lead Paint, and Infant Blood Lead Levels," *American Journal of Public Health 75(4):* 403–404. ***ajph.aphapublications.org/cgi/reprint/75/4/403.pdf***

Rich, 2002. Rich, David Q., G.G. Rhoads, L. Yiin, J. Zhang, Z. Bai, J.L. Adgate, P.J. Ashley and P.L. Lioy, "Comparison of Home Lead Dust Reduction Techniques on Hard Surfaces: The New Jersey Assessment of Cleaning Techniques Trial," *Environmental Health Perspectives, 110(9):* 889-893, September 2002. ***ehp.niehs.nih.gov/members/2002/110p889-893rich/rich-full.html***

White, 2003. White, K. and G. Dewalt, Unpublished comments on proposed revisions to Chapter 14 of the HUD *Guidelines,* May 2003.

Yiin, 2002. Yiin, Lih-Ming, F.F. Rhoads, D.Q. Rich, J. Zhang, Z. Bai, J.L. Adgate, P.J. Ashley and P.J. Lioy, "Comparison of Techniques to Reduce Residential Lead Dust on Carpet and Upholstery: The New Jersey Assessment of Cleaning Techniques Trial," *Environmental Health Perspectives, 110(12):* 1-5, December, 2002. ***http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.021101233***

Zhu, 2012. Zhu, J., E. Franko, N. Pavelchaka and R. DePersis. Worker Lead Poisoning during Renovation of a Historic Hotel Reveals Limitations of the OSHA Lead in Construction Standard. *Journal of Occupational and Environmental Hygiene.* 9:8. Published online June 25, 2012, published on paper, August 9, 2012. DOI: 10.1080/15459624.2012.700273

Chapter 13: Abatement by Encapsulation

Chapter 13: Abatement by Encapsulation

How To Do It

1. **Determine if encapsulants can be used. Do not encapsulate the following surfaces:**
    a. Friction surfaces, such as window jambs and doorjambs.
    b. Surfaces that fail patch tests.
    c. Surfaces with substrates or existing coatings that have a high level of deterioration.
    d. Surfaces in which there is a known incompatibility between two existing paint layers.
    e. Surfaces that cannot support the additional weight stress of encapsulation due to existing paint thickness.
    f. Metal surfaces that are prone to rust or corrosion.
2. **Conduct field tests of surfaces to be encapsulated for paint film integrity.**
3. **Consider special use and environmental requirements** (e.g., abrasion resistance and ability to span base substrate cracks).
4. **Examine encapsulant performance test data supplied by the manufacturer.**
5. **Conduct at least one test patch on each type of building component where encapsulant will be used.**
6. **Prepare the surface in the manner selected for the complete job.** For both non-reinforced and reinforced coatings, use a 6- by 6-inch test patch area. Prepared surfaces for patch testing should be at least 2 inches larger in each direction than the patch area.
7. **Use a 3- by 3-inch patch for fiber-reinforced wall *coverings*.** For rigid coatings that cannot be cut with a knife, use a soundness test.
8. **Allow coating to cure and then visually examine it for wrinkling, blistering, cracking, bubbling, or other chemical reaction with the underlying paint for liquid coating encapsulants.** For all encapsulants, carry out the appropriate adhesion tests.
9. **Record the results of all patch tests on Form 13.1.**
10. **Develop job specifications.**
11. **Implement a proper Worksite Preparation Level (see Chapter 8).**
12. **Repair all building components and substrates as needed, e.g., caulk cracks and repair sources of water leaks.**

13. **Prepare surfaces. Remove all dirt, grease, chalking paint, mildew and other surface contaminants**, remnants of cleaning solutions, and loose paint. All surfaces should be deglossed, as needed.

14. **Ventilate the containment area whenever volatile solvents or chemicals are used.**

15. **Monitor temperature and humidity during encapsulant application or installation.** For liquid coatings, monitor coating thickness to ensure that the encapsulant manufacturer's specifications are met.

16. **Conduct cleanup and clearance.**

17. **Have the owner monitor the condition of the encapsulant after the first 6 months and at least annually thereafter.** Repairs should be made as necessary. Reevaluations should be completed according to the schedule in Chapter 6.

18. **Provide information to residents on how to care for the encapsulation system properly and how to contact the owner to get repairs completed safely and quickly.**

19. **Maintain accurate records.** Make sure the exact detailed locations of encapsulant applications, concentration of lead in the paint underneath the encapsulant, patch test specifications and results, reevaluations, product name, contractor, and date of application or installation, along with a copy of the product label and a material safety data sheet (MSDS) for the product are included in your records. Record failures and corrective measures, signs of wear and tear, and your certified risk assessor.

I. Introduction

This chapter provides information on: (1) assessment of the suitability of a surface (i.e., the existing paint film) and the building component substrate for encapsulation; (2) types of encapsulant systems; (3) considerations for selection and use of encapsulants; (4) field patch testing; (5) general surface preparation and application procedures; and (6) procedures for ongoing monitoring by the owner and reevaluation by a risk assessor.

A. Definition

Encapsulation is a process that makes lead-based paint inaccessible by providing a barrier between the lead-based paint and the environment. This barrier is formed using a liquid-applied coating (with or without reinforcement materials) or an adhesively bonded covering material. While encapsulant systems may also be attached to a surface using mechanical fasteners, the primary means of attachment for an encapsulant is bonding of the product to the surface (either by itself or through the use of an adhesive).

Encapsulants should not be confused with enclosures, which are rigid barriers fastened by mechanical means to the base substrate (or the structural members). Enclosures rely on mechanical fasteners as the primary method of attachment. Enclosures are addressed in Chapter 12, Section III.

Encapsulation depends upon a successful bond between the surface of the existing paint film and the encapsulant for performance. However, this condition alone is not sufficient for encapsulation system success. All layers of the existing paint film must adhere well to each other, as well as to the base substrate. If not, the encapsulation system may fail. Thus, proper assessment of the suitability of the surface and substrate for encapsulation is essential prior to the application and installation of the product.

The success of an encapsulation application also depends on successful patch testing in the field, proper completion of surface preparation and application procedures, ongoing monitoring by the owner and resident, and periodic reevaluation by a risk assessor. These procedures are discussed in detail in subsequent sections of this chapter.

B. Standards and Acceptance

The American Society for Testing and Materials (ASTM International) has issued three standards for liquid coating encapsulants (***www.astm.org/Standard/index.shtml***):

- **E 1975-04** – Standard Specification for Non-Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings.
- **E 1796-03(2011)** – Standard Guide for Selection and Use of Liquid Coating Encapsulation Products for Leaded Paint in Buildings.
- **E 1797-04** – Standard Specification for Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings.

Some State and local governments have such standards in place; if they are more stringent, they should be followed.

Encapsulation is considered an acceptable method of federally supported lead-based paint abatement or federally supported lead-based paint hazard abatement, provided the following conditions, procedures, and precautions exist or are followed:

- The encapsulation product or system is warranted by the manufacturer to perform for at least 20 years as a durable barrier between the lead-based paint and the environment in locations or conditions similar to those of the planned application.
- Selection and use of encapsulation products or systems follow the manufacturer's recommendations and the procedures and precautions described in this chapter of the *Guidelines* and in other relevant chapters, including those on occupant protection, worker protection, cleanup, clearance, and waste disposal.
- Patch testing is completed successfully.
- The property owner or local government agency conducts surface-by-surface visual monitoring of all encapsulant applications 1 month and 6 months from the date of completion of the application and at other times as specified for encapsulation in Chapter 6 of these *Guidelines* and records those results.
- Failures are repaired as soon as possible, and repairs are made according to manufacturer's recommendations and the procedures and precautions recommended in this chapter and other relevant chapters of these *Guidelines*, including those pertaining to resident protection, worker protection, cleanup, clearance, and waste disposal.

C. Background

Encapsulation technologies can offer safe and effective control of lead-based paint hazards. Encapsulation can be less expensive than other options and may be one of the only alternatives that can be used in certain situations. Encapsulants may also be used in combination with other methods. Unless there is significant surface deterioration, encapsulants may generate low amounts of leaded dust. However, if the encapsulation system fails, repairing the damage, as well as covering the exposed lead-based paint surfaces, may result in high maintenance costs. The advantages and disadvantages of using encapsulants are listed in Table 13.1.

In recent years, encapsulation has been used less often than other abatement methods. The disadvantages of encapsulation as an abatement method appear to have outweighed the advantages in many cases. In historic properties, however, encapsulation may or may not be appropriate (see Chapter 18). Although several States and local governments created lists of approved encapsulants in the past, they may remain in effect. In all cases, the determination should be made what rules and regulations apply before selecting an abatement method for a specific project. When the purpose of the encapsulation of known or presumed lead-based painted surfaces is permanent (that is, 20 years or more) elimination of lead-based paint hazards, that project is abatement and EPA's (or an EPA-authorized state or Tribe's) abatement rules, rather than EPA's (or an EPA-authorized state or Tribe's) Renovation, Repair and Painting (RRP) Rule, apply to that project. However, if application of an encapsulant is not intended as lead hazard abatement, that project is considered a renovation covered by the RRP Rule. This chapter primarily covers encapsulation when used as an abatement method.

A number of products currently being marketed specifically for lead-based paint abatement have been used as specialty coatings and coverings for many years. Some sites with interior and exterior coatings have been found to remain intact for up to 3 years. On the other hand, the same systems have been observed to fail immediately after application or within a period of months due

to inadequate surface preparation or improper selection. Some failures have been widespread, in which the coating system separates completely from the substrate. Some have been more limited, in which cracks appear in the coating or the product is abraded (rubbed away) through normal wear and tear. The limited failures have been attributed to use of encapsulants on surfaces that were not suitable for encapsulation, inadequate surface preparation, or improper selection of product type.

The standards for minimum performance by ASTM involve laboratory testing of products applied to bare substrates under controlled settings. Specific use situations may warrant more stringent performance requirements for certain properties. The encapsulant user will need to determine whether more rigorous performance is needed. Product selection and use considerations are addressed later in this chapter.

II. Assessment of Surfaces and Components for Suitability

Some surfaces and components are not suitable candidates for encapsulation. In these situations, a decision not to encapsulate can be made without further consideration or testing (see Table 13.1). For all other surfaces and components, more extensive field testing is recommended for encapsulation. Once the determination is made that encapsulation is suitable, patch testing of candidate encapsulant systems (including use of the manufacturer's recommended materials, surface preparation procedures, and application procedures) is essential.

Table 13.1 Advantages and Disadvantages of Using Encapsulants.

Advantages	Disadvantages
✦ Residents may not need to be relocated. Minimal generation of leaded dust if surface preparation is minimal.	✦ Experience and information on long-term durability is limited. Use on friction surfaces is inappropriate.
✦ Moderate application training requirements. Less costly and more timesaving than some other control techniques if surface preparation is minimal. Wide range of product types available to meet special needs. Finish carpentry work may not be required.	✦ Durability depends on condition of previous paint layers. Field compatibility testing of encapsulant with particular lead-based painted surface is essential (patch testing). Encapsulant system success depends on proper surface preparation. Periodic monitoring and maintenance by the owner is required, since lead has not been removed.
	✦ Susceptible to water damage; system failure can be extensive.
	✦ Application may be weather- and temperature-dependent and may require several coats.
	✦ Some systems may contain toxic ingredients.

A. Specific Surfaces and Components Not Suitable for Encapsulation

Friction surfaces. These surfaces include window jambs and exterior wood flooring or stairs covered with lead-based paint. Some interior floor and stair surfaces may be suitable for encapsulating with a rigid floor covering (e.g., vinyl tile) that is adhesively bonded to the surface (see Figure 13.1).

Deteriorated components or paint films. Components must be sound and essentially free of deterioration to be suitable for encapsulation. Deteriorated components include rotten wood, rusted steel, spalled plaster, and masonry in need of repointing. Use of encapsulants on steel structures is especially difficult, since most do not have corrosion inhibitors and will fail if the steel underneath rusts. Also, components affected by water leaks, poor moisture venting, or other moisture-associated problems should not be encapsulated unless the moisture problem is corrected first. Additional information on inspection of components for damage associated with water penetration can be found in Chapter 11.

Severely deteriorated paint films. Lead-based paint films that are severely deteriorated (e.g., cracked and peeling over most of the surface) are not suitable for encapsulation (see Figure 13.2).

FIGURE 13.1 Encapsulating a floor with vinyl tiles

FIGURE 13.2 Deteriorated paint on surfaces that are unsuitable for encapsulation

Surfaces in which there is a known incompatibility between two existing coating layers. Usually this determination cannot be made without field-testing. However, if available, historic records may reveal conditions known to cause poor interlayer adhesion. For example, use of a flat latex paint over an improperly prepared, glossy oil-based enamel will likely result in an existing paint system that is not suitable for encapsulation.

B. All Other Surfaces

Surfaces of nondeteriorated substrates having reasonably stable lead-based paint films can be considered for encapsulation. However, a decision to encapsulate should be made only after a field evaluation of the condition of these films is conducted, using patch tests. A patch test is a field test procedure in which a small area of the existing lead-based paint film is prepared and the encapsulant product is applied or installed and cured in the manner intended for the large-scale job. A field evaluation should determine the extent of deterioration, the condition of the surface, and the integrity of the underlying paint layers. These factors should be considered because an encapsulant cannot attach itself to a deteriorated paint base. Some paint films cannot support the additional weight or stress of an encapsulant, because of existing film thickness, poor adhesion between paint layers, or low cohesive strength within a layer. Existing film thickness can be measured using a dry film thickness gauge, such as a Tooke gauge or a micrometer. Information on the thickness of existing coatings can be provided to an encapsulant manufacturer's or distributor's technical representative to help in making appropriate recommendations.

The visual extent of deterioration, surface deterioration, and interfacial or cohesive film weaknesses should be evaluated, before use of encapsulants, in the following ways:

Visual Evaluation. Visual deterioration includes peeling, flaking, blistering, and cracking of paint films. The level can be rated based on ASTM photographic standards, such as ASTM D 610 for rusting, D 770 for blistering, etc (***www.astm.org/Standard/index.shtml***). An entire surface can usually be inspected for these defects. Often, both the extent of the surface that is deteriorated and level of deterioration are assessed. For example, 5 percent of the surface may be deteriorated to a rating level of one (i.e., severe) or the entire surface may have slight deterioration (Refer to Chapter 5 Section I.D.3). Quantitative rating in this fashion may be required by the encapsulant manufacturer, but not by HUD at this time.

Surface Deterioration. Surface deterioration includes chalking, mildewing, and soiling. Standard ASTM procedures can be used to rate the degree of these conditions. Enough determinations need to be made to properly characterize the surface. However, since this type of deterioration tends to be widespread and is usually rather uniform over large surface areas, determination of two or three locations may adequately describe the condition.

Interfacial and Other Film Integrity Properties. Since most lead-based paint films are made up of many paint layers, a measure of how well the layers are adhering to each other and the base substrate is needed prior to the use of an encapsulant. Also related to interfilm adhesion is cohesive strength within films. These properties are usually assessed using a field adhesion test, such as a crosshatch or "X-cut" test with tape, a pull-off adhesion test, or a probe of the film with a knife. Interfacial deterioration may not be uniform over a large surface area (since it may be defect-related) and will vary from location to location across a surface. Thus, it is important to conduct enough interfacial integrity tests to obtain a representative sampling of the entire area.

Surfaces with intact paint and that sticks to the substrate are good candidates for non-reinforced encapsulants. Surfaces with peeling, flaking, or cracking paint films are usually not good candidates for non-reinforced encapsulants unless the loose coating can be removed. However, reinforced encapsulants may be suitable if the areas of deterioration are localized and reasonably small. In these cases, the reinforced coating can hold across the deteriorated areas. Encapsulants that have adhesive in them may be suitable for either surface type.

III. Encapsulant Classification

Within each of the three general classifications, there is a range of material types and properties (see Table 13.2). Manufacturer's data must be consulted to obtain specific information.

Residential paints, such as latex and alkyd-based paints and canvas-backed vinyl wallpaper, do not constitute encapsulant systems unless they pass the patch test (evaluating the encapsulant on a small area of the painted surface before the start of work) and meet the performance requirements of this chapter and any quantitative performance standards defined by ASTM or other local, State, or Federal agency. (See Section VI.A)

Table 13.2 Categories of Encapsulants.

Encapsulant Category	Application and Installation Method	Characteristics
Non-reinforced liquid coatings.	Usually applied with brush, roller, or spray.	Interior and exterior products. Some properties vary widely, such as elongation (e.g., elastomeric with high elongation to rigid with limited elongation), dry film thickness (0.05 mm to greater than 0.5 mm), hardness, dry/cure time, and compatibility with existing painted surfaces.
Liquid coatings reinforced with cloth, mat, fibers, etc.	Applied with brush, roller, spray, or trowel. Usually applied in two steps.	Interior and exterior products. Properties vary widely.
Materials adhered with an adhesive (e.g., fiber mat, vinyl floor tile).	System is usually installed in two steps: (1) adhesive application and (2) encapsulant product installation.	Classification includes sheet vinyl systems, floor tile, wall systems, and other adhesively bonded systems.

IV. Minimum Performance Requirements for Encapsulants

Four general performance requirements for encapsulants are as follows:

- The encapsulant must be capable of being applied safely and must not contain toxic substances.
- The encapsulant must adhere to existing paint films.

- The encapsulant must have the ability to remain intact for an extended period of time when exposed to the expected environmental conditions and use patterns.
- The encapsulant and its application procedure must comply with fire, health, and environmental regulations.

A. Safe Application

All encapsulants must be able to be applied safely, without excessive worker or occupant exposure to hazardous solvents, curing agents, or other chemicals in the encapsulant, either by inhalation or by contact with the skin.

B. Adhesion

An encapsulant must adhere to the existing paint film. Adhesion can be measured using peel, tensile, or shear tests. However, adhesion of an encapsulant to the lead-based paint film is not sufficient for success of the encapsulant system; the integrity of the underlying paint layers is also crucial. Each of these layers must adhere well to other layers, and the base substrate. In addition, each layer must have sufficient cohesive strength to support the increased internal stresses caused by the addition of an encapsulant layer.

C. Ability To Remain Intact

The ability of a film to remain intact depends on many factors, some of which are specific to the conditions in which the encapsulant is used. For example, an encapsulant may suffer impact and abrasion damage. It may also be exposed to water and other household chemicals, changing temperatures, changing substrate dimensions, and other degrading environmental conditions. Laboratory procedures used to investigate these properties are loosely grouped into tests for mechanical, chemical resistance, and durability properties.

1. Mechanical Properties

Mechanical properties include tensile properties (elongation, tensile strength, modulus), flexibility, abrasion resistance, and impact resistance. Most of these properties are interrelated and may depend on temperature.

Mechanical properties of coatings should be considered in selecting an appropriate material. For example, more flexible materials may be more likely to resist cracking when the substrate moves because of vibration, changes in temperature, changes in moisture content, or settling. If this mode of performance is important, the encapsulant must remain flexible over the complete range of exposure temperatures. Some elastomeric encapsulants have failed by cracking because they became brittle at low temperatures. Reinforced encapsulants may be more likely to resist cracking over existing substrate cracks or new substrate cracks than non-reinforced encapsulants. This is because stresses produced in a reinforced encapsulant as a result of substrate cracking or other movement are distributed over a larger area than for non-reinforced materials.

Abrasion resistance refers to the ability to resist wearing, such as from rubbing against a surface or from cleaning with abrasives. Examples of surfaces where abrasion is likely to occur

include railings, walls, moldings around door and window openings, and interior window sills where air conditioner units are installed and removed.

Impact resistance is the ability of a coating to resist cracking or loss of adhesion upon direct impact by an object, such as a toy or tool. Good impact resistance is needed for surfaces adjacent to door openings and for walls in recreation rooms and entryways.

2. Chemical Resistance Properties

Chemical and water resistance is essential for long-term stability of an encapsulant. Interior encapsulants may be exposed for extended periods of time to both water (steam, vapor, and liquid) and, in limited situations, chemicals. For example, on horizontal surfaces, water or chemicals (e.g., cola, cleaning solutions) may stand until evaporated. An encapsulant must be able to withstand such exposures without blistering, peeling, cracking, or losing film integrity.

3. Durability

For all encapsulants, it is essential that the mechanical and chemical properties of the material remain essentially constant over time. For exterior exposures, this means that an encapsulant must also be resistant to degradation by sunlight, moisture, and temperature variations. Until specific criteria are available, manufacturers should be asked to supply information and warranties on the durability of their products.

D. Fire, Health, and Environmental Requirements

Encapsulants must meet all local fire code requirements. Since their film thicknesses are often much greater than that of paints, there may be additional fire-related requirements. Building codes and material safety data sheets (MSDS) must be consulted to ensure safe application and to provide information on when residents can safely reenter the area. The MSDS will also provide information on toxic substance content. In addition, environmental volatile organic compounds (VOC) regulations limit the VOC content of paints in the U.S., with additional regulation in many localities.

V. Factors to Consider in Selecting and Using Encapsulant Systems

When encapsulation is suitable and is the desired control strategy, a user has a wide range of systems from which to select. In addition to the requirements of Section IV, the decision to select a specific type or system should take into account several other factors, including those related to the type of lead-based paint film and base substrate, service conditions, cost, livability, and health and safety issues.

A. Base Substrate

The base substrate can be wood, plaster, steel, cement, masonry, stucco, or some other material. Thus, the movement and possible deterioration of the substrate vary and should be considered. For example, wood will expand and contract with changing water content and perhaps check and crack as it ages. Wood rot could also occur if water leaks or other moisture problems are ignored. Stucco may develop cracks as it ages or the building settles. An encapsulant must be able to move with the base substrate without cracking or otherwise deteriorating.

FIGURE 13.3 Encapsulated historic components.

Walls with extensive cracks and gaps that cannot be bridged by non-reinforced coatings may be good candidates for reinforced coatings or wall coverings. For situations in which non-reinforced coatings can be used, cracks must be filled with a caulking or sealing compound compatible with the encapsulant and the substrate to which it is applied.

Control corrosion of metal substrates with a proper primer before applying an encapsulant. Uncontrolled rusting will quickly lead to delamination of an encapsulant. Thus, a corrosion-control primer is an essential part of an encapsulant system for metal.

B. Lead-Based Paint Film Properties

An encapsulant must be compatible with the existing lead-based paint film. Both chemical and physical properties of the film are important. A compatible encapsulant must form a strong bond with the lead-based paint film but not degrade the existing paint layers. Epoxies, polyurethanes, and other coatings having strong solvents are often incompatible with oil/alkyds and latex paint films.

Physical properties of old films also affect performance of coatings and adhesives applied over them. Water-based products tend to bond less successfully to glossy, smooth, chalky, dirty, or oily paint film surfaces than do compatible solvent-based materials.

Field patch testing is the best procedure for determining compatibility with the existing lead-based paint surface and early performance properties of the encapsulant.

C. Application and Installation Constraints

Application constraints include the skill required for application, the method of application and acceptable range of environmental conditions, and regulations for worker safety and environmental protection.

1. Skill Level

Different levels of skill are required for application of the various classes of encapsulants. Generally, liquid non-reinforced coatings require the lowest skill level. Coatings having two components (requiring rapid, efficient application), or those incorporating a mat, require more experience and skill. Use of adhesively bonded materials, such as tile and flexible wall coverings, also require an intermediate skill level for application (HUD, 1990b). Overall, skills required for encapsulation are lower than those for enclosure and replacement. Nevertheless, specific knowledge and skills are critical for success in the application of any encapsulant.

2. Method and Environmental Conditions

Depending on the specific encapsulant, application of the coating or adhesive may be by brush, roller, spray, or trowel; however, in certain situations, some of these methods may not be feasible. For example, if spraying is not practical, an encapsulant that can be applied by

another technique will be required. The acceptable environmental conditions vary depending on the type of encapsulant. For instance, temperatures above 40° F and below 95° F and relative humidity less than 85 percent are generally required for water-based coatings. Moisture-cure polyurethanes may require a minimum relative humidity. A manufacturer's technical specifications should be consulted for specific requirements.

3. Regulations

Worker safety requirements vary depending upon the material being applied. The manufacturer's MSDS should be consulted for appropriate controls. The EPA published a national VOC emissions rule for all architectural coatings (63 Federal Register 48848; September 11, 1998), which became effective in 2000 (the final, amended, rule was published at 65 Federal Register 7736; February 16, 2000; ***www.epa.gov/ttn/atw/183e/aim/fr16fe00.pdf***). Consequently both local and national rules may place VOC limits on the use of encapsulants.

D. Environmental Service Conditions

The conditions under which the encapsulant will be used are important when selecting an encapsulant. For exterior exposures, consideration must be given to an encapsulant's ability to withstand varying weather conditions, including temperature changes, temperature extremes, water, moisture vapor, air pollutants, and ultraviolet radiation. For example, some elastomeric products can become brittle when exposed to cold temperatures and may shatter on impact. Other materials, such as epoxies, prematurely chalk and erode because of ultraviolet deterioration.

Since some exterior – and even some interior – environments may be quite wet, encapsulants must not fail due to moisture. The water vapor permeability should be considered, along with the permeability of the component to be encapsulated. An encapsulant with low water vapor permeability may peel because of a moisture gradient across the component. For example, in climates with cold winters, an impermeable encapsulant applied to exterior walls lacking an internal vapor barrier may blister and fail because of interior moisture passing through the building envelope.

E. Use Conditions

The use of encapsulation on impact and friction surfaces is generally not recommended because the covering does not protect lead-based paint from impact and abrasion. HUD's Lead Safe Housing Rule does not include coating (or painting over the surface) as an allowable interim control to treat painted impact and friction surfaces (see 24 CFR 35.1330(c)(6). If a lead-based paint surface is subject to frequent abuse (e.g., abrasion, impact, and rubbing), especially careful consideration must be given before using encapsulation as an abatement method. If encapsulation is selected, thoughtful consideration must also be given to the selection of an encapsulant product for the particular conditions of wear and tear the component will receive. Also, the tolerance for increased coating thickness varies depending upon the component type. For example, reinforced coatings or fiber-reinforced wall coverings having high abrasion resistance are potential candidates for walls subject to extensive abrasion and impact wear, such as in entrance hallways. Coatings having excellent chemical resistance (e.g., some epoxies) can be good candidates for surfaces containing large amounts of hand oil, such as handrails and surfaces around doorknobs. When use factors are not considered, premature failures are likely. For example, elastomerics, which typically have poorer chemical resistances than two-component coatings, have been reported to fail prematurely when used on handrails (Maryland, 2002).

F. Encapsulant Service Life

Epoxy paints, cementitious encapsulants, floor tile, and flexible adhesively bonded wall coverings have been used for other purposes and tend to have relatively long life spans. Some coatings have qualities that may make them more durable than ordinary residential paints, e.g., a polyurethane binder is usually more abrasion-resistant than an oil binder. Since some encapsulants have been in use for a few years, field data may be available for some products. Also, the manufacturer's warranty or guarantee is an important consideration in product selection. When the product is used for lead-based paint encapsulation, conditions of the warranty may require prework inspections, surface preparation inspections, in-process inspections, and a final inspection.

G. Safety Constraints and Information

Each encapsulation product has an MSDS available from the manufacturer, which should be obtained, reviewed, and filed as part of the recordkeeping procedure. The MSDS provides information on hazardous ingredients (specific chemical identities and common names); physical and chemical characteristics (boiling point, water solubility, melting point, evaporation rate, specific gravity, vapor pressure); fire and explosion hazard data (flashpoint, extinguishing media and firefighting procedures, and any unusual fire/explosion hazards); reactivity (stability and incompatibility, hazardous decomposition, or products); health hazard data (routes of entry, acute and chronic health hazards, carcinogenicity, signs and symptoms of exposure, medical conditions generally aggravated by exposure, and emergency and first-aid procedures); precautions for safe handling (waste disposal, handling, and storing); and use and control measures (respiratory protection, eye protection, protective gloves, ventilation, and other protective measures and hygiene practices).

Some MSDSs do not disclose the presence of toxic substances under trade secret provisions. If an MSDS does not show chemical ingredients and claims no hazardous ingredients are present, but still indicates eye and skin protection or ventilation is necessary, the MSDS may be deficient. If employees believe an MSDS is deficient, they should notify the individual responsible for MSDS sheets or the Hazard Communications program in their organization. Occupational Safety and Health Administration regulations require employers to maintain current MSDSs for all products containing hazardous chemicals that are used by employees.

It may be useful to have a toxicologist or industrial hygienist review the MSDS and/or consult any of the available toxicology database systems, such as the Hazardous Substance Database, the Integrated Risk Information System (IRIS) (EPA), and Registry of Toxic Effects of Chemical Substances (RTECS) from the National Institute for Occupational Safety and Health (NIOSH). Both worker and resident safety should be taken into consideration. For example, residents and pets may be exposed to VOCs during the drying or curing process.

H. Aesthetics

To maintain an acceptable appearance, the finished product should be capable of being painted, or otherwise coated, and maintained. Consideration should also be given to the importance of having a finished surface that is smooth or rough (textured) or soft or hard. For example, encapsulants that are either soft or have a rough finish are not appropriate for handrails and floors and may make cleaning of wall surfaces more difficult. Also, soft coatings have a greater tendency to adhere to or be imprinted by objects placed on them than do harder coatings. The final thickness of the encapsulant also affects the appearance of the product. For example, the final thickness of many

elastomeric encapsulants (10 to 20 mil) is about 10 times greater than a single layer of paint and can conceal desired detail on wood trim and moldings.

If the existing coating is not intact or smooth and requires substantial sanding and feathering, then a non-reinforced liquid encapsulant may not be the appropriate product type. Non-reinforced liquid encapsulants are less likely to hide surface imperfections than reinforced liquid coatings or adhesively bonded wall coverings.

I. Repairability

Repairability refers to the ease of repairs and the appearance of the affected areas. It is important to determine if repairs can be performed only by outside contractors with special equipment or skills or if typical maintenance workers can do them. Generally, all encapsulants are repairable, although some types may be more difficult to repair than others.

J. Cost

Depending upon the type of substrate to be treated, the life cycle costs of encapsulation methods may be less than for enclosure methods (HUD, 1991). Life cycle costs include both the initial costs and reexamination and maintenance costs. Initial per-unit costs (material plus labor) associated with the various encapsulant products vary. Since labor may be a major part of the cost, encapsulant systems requiring more than one layer or step may be more expensive than those completed in one operation. In addition, the total time required for application and cure is a cost-related factor if occupants need to be housed away from the worksite during this time. The length of time needed for the encapsulant to remain effective should also be included in life cycle cost considerations.

K. Technical Assistance

For large projects, a technical representative from the product supplier or manufacturer should be involved in the choice and inspection of the surface preparation procedure and the application processes. It is important to clarify the nature and extent of any support that is being offered. If no technical support is offered, consideration might be given to other products where support is available. The manufacturer's involvement in quality assurance activities is desirable, and every effort should be made to cooperate with those involved.

VI. Specific Encapsulant Products and Surface Preparation Procedure

A. Encapsulant Product Selection

Once a surface has been found suitable for encapsulation and a decision has been made to encapsulate, a specific product or product type is selected, together with appropriate surface preparation and application procedures. The procedure for selecting a specific encapsulant product is to: (1) obtain information from the manufacturer's literature, users' experiences, and any other credible knowledge base on the products' ability to meet the general performance requirements and the factors listed previously in this chapter; (2) select a group of candidate encapsulant products and surface preparations using this information; and (3) conduct field patch tests with the candidate products on the surfaces to be encapsulated.

B. Surface Preparation

After an encapsulant product or type has been selected, surface preparation procedures need to be identified. All encapsulant manufacturers provide surface preparation recommendations for their products. In some instances, manufacturers provide more than one specific recommendation. Thus, it is essential to select one or more suitable specific procedures prior to application of the encapsulant. Consideration should be given to identifying and testing more than one specific surface preparation procedure because the same encapsulant may be successfully used with one procedure and not another. Cost and time savings may be significant for some encapsulants if more than one surface preparation is tested at the same time. The cure time, and thus the test time, may be long.

General surface preparation requirements, which are similar for all encapsulants, are presented below. Materials used and debris generated during surface preparation may be hazardous and must be treated appropriately.

1. Cleaning

Encapsulants should not be applied over dirt, rust, oil, grease, mildew, chalk, or other surface contaminants. Surfaces should be cleaned with nonsudsy degreasers, or other materials recommended by the manufacturer. Additional cleaning agents may be needed for mildew or chalk removal. Cleaning can be done by hand with a sponge or rag or with the aid of power washing equipment. In either case, it is essential to rinse the surface thoroughly with water to remove cleaning residue. Job specifications may require that specific standards be met for removal of surface contaminants, e.g., ASTM D 4214 for chalk. In situations where chalk cannot be removed to an acceptable level, the use of a primer or stabilizer may be needed. If a special primer is used, it is essential that it is one recommended by the encapsulant manufacturer.

2. Deglossing

The surface of some lead-based paint films is smooth and glossy. Deglossing to roughen the surface is usually recommended by manufacturers to improve adhesion of the encapsulant coating. Often, specific deglossing materials will be recommended, since they must be compatible with the encapsulant. For some very hard, chemically resistant surfaces, deglossers may not work, and wet sanding may be needed. Since the choice of deglossing materials or methods affects encapsulant adhesion, separate patch tests using different deglossers or methods should be considered.

3. Removal of Loose Paint

Loose paint should be removed by wet scraping.

4. Preparing Exposed Base Substrates

These substrates can warrant different surface preparation requirements than lead-based paint surfaces. For example, the surface of bare wood exposed to sunlight should be wet sanded to remove the degraded surface layer. Corroded metal should be cleaned using HEPA-assisted power tools or HEPA vacuum blasting to remove surface rust and contaminants. Bare concrete and masonry materials should be washed to remove loose dirt, degraded materials, or other surface contaminants.

C. Field Patch Tests

A patch test evaluates the encapsulant on a small area of the painted surface prior to the start of work. When more than one surface preparation is being tested, each surface preparation procedure, plus the encapsulant, is a separate patch test. An encapsulant/surface preparation system that fails a patch test is not suitable for use in the large-scale job.

Certified contractors or knowledgeable workers can do surface preparation and encapsulation applications and installations. After the encapsulant has cured according to the manufacturer's recommendations, an inspector performs the evaluation. It is important to contact local or State agencies before starting work in case they have inspection protocols in place for this kind of work.

1. Size of Patch Tests

For liquid-applied systems, the recommended test patch size is about 6 by 6 inches. For narrow surfaces such as doorframes, a differently shaped patch may be needed but should be about the same area. Smaller 3- by 3-inch patches may be used for fiber-reinforced wall coverings, since they may be impossible to remove and can be thick enough to show through a completed system.

2. Location of Patches

At least one test patch should be applied to each type of component in each room or exterior location representing different types of paint where the encapsulant is to be used. For example, if the encapsulant is to be used on walls in both the kitchen and the living room, a patch test should be done on one wall in each room. Although the rooms may appear to have the same surface paint, past painting practices may have been different; therefore, both rooms should be tested. The paint testing protocol contained in Chapter 7 also is based on the idea that paint history and type is unique for each room. If localized areas of a surface or component are suspected of having underlying adhesion problems due to moisture, then the patch test should be done in one of these areas. Outer walls are good areas to test since they may be more likely to experience moisture. Similarly, load-bearing walls are good areas for patch testing because they are subject to stress. For thick, reinforced coatings or wall covering systems, patches should be placed in an inconspicuous place, if possible. If it is known that one type of component has the same paint history in several rooms, only one patch test is needed for that component type.

3. Surface Preparation for Patch Testing

The area prepared for the patch test should be at least 2 inches larger in each direction than the area to be encapsulated for the test, unless the shape of the component makes this impossible. The surfaces should be inspected following preparation to ensure that the preparation was carried out properly. The inspection results should be documented separately for each patch.

4. Encapsulant Application and Installation

The encapsulant(s) should be applied in accordance with the manufacturer's recommendations. The application method, wet film thickness (if appropriate), and environmental conditions should be documented for each patch, since they should be the same when used on the

target surface. For encapsulants that cannot be cut with a knife, consideration should be given to substituting the soundness test described below. After the encapsulant has cured, the patch is examined for adhesion and compatibility with the existing lead-based paint film. Since the cure times of encapsulants range from less than 24 hours to a period of months for a complete cure, it may not always be possible to perform patch tests on completely cured patches. Nevertheless, the patch test is still a useful method of assessing the likelihood of success with a given product on a given surface.

5. Patch Preparation for Conducting a Lead-Based Paint Soundness Test

The following procedure has been employed in past projects to prepare a patch test for soundness or integrity of the lead-based paint film/base substrate system. A 3/8- by 3-inch bead of construction adhesive is applied to the central portion of the face of an 8-inch-square piece of gypsum wallboard. The wallboard square is pressed onto a 6- by 6-inch patch. The curing time recommended by the adhesive manufacturer should be observed. Evaluation of results is discussed below.

6. Visual and Adhesive Evaluation of Field Patch Tests

The encapsulant coating should be visually examined for signs of incompatibility with the paint film. These signs include wrinkling, blistering, cracking, cratering, and bubbling of the encapsulant. Solvent-based encapsulants (e.g., epoxies, polyurethanes) may react with the underlying paint layer and cause bubbling, disbonding, or other lead-based paint film deterioration. Bubbling or disbonding may be detected by scraping the *surface* of the patch, using sufficient pressure to break any visible and nonvisible surface bubbles. Surface imperfections may indicate that the encapsulant is incompatible with the existing coating. Bubbles may also form in liquid encapsulants because of foaming during application, solvent entrapment during cure, and other conditions. If it can be established that the bubbles are associated with chemical reactions between the encapsulant and the underlying paint film, or the extent of bubbling is unacceptable, the patch test is a failure. If deeper probing reveals a weakened layer of paint, the patch test is also a failure. If it has failed a patch test, the encapsulant should not be applied to the target surface.

While the ASTM has two standard field methods for measuring adhesion of coatings – a tape test using pressure-sensitive tape (ASTM D 3359) and a portable adhesion tester (ASTM D 4541), they have not been technically defined or used for field patch testing of lead-based paint encapsulants.

"X"-Cut Adhesion Method. For the "X"-cut method, the inspector should take a sharp cutting tool (e.g., a knife, razor blade, or scalpel) in good condition and a hard metal ruler (as a cutting guide) and inscribe an "X" in the center of the patch after the encapsulant system has cured according to the manufacturer's recommendations. Each cut line should be 1 1/2 to 2 inches long and should be made through the coating, the paint, and the patch all the way down to the substrate. A flashlight may be necessary to determine the depth of the cut. If the cut does not go through the patch to the base substrate, a second "X" cut should be made in a different location. The first cut should not be deepened.

To evaluate the adhesion and integrity of the paint film, the inspector should use the point of the cutting tool to attempt to peel or lift the patch from the existing topcoat. The point of the tool should be placed below the encapsulant layer at the intersection of the two cut lines. If the inspector can lift, peel, or tear a large (more than 1/2 inch- or 1/2 inch-square) portion or section

of the patch away from the existing topcoat to which it was applied, then the encapsulant fails the patch test. The inspector should expect that a small piece of the patch would separate from the base substrate (up to 1/4 to 1/2 inch). This does not indicate failure of the patch test.

Patch-Edge Method. For the patch-edge method, the inspector should make a cut adjacent to the edge of the patch through to the base substrate. If the thickness of the encapsulant does not change abruptly, but gradually decreases at the edge of the patch, the cut should be made through as thick a layer of the encapsulant as possible to the base substrate. The point of the knife should be placed under the encapsulant at the cut, attempting to peel or lift the patch from the lead-based paint topcoat or locate other delaminated layers within the lead-based paint film. If a large portion of the encapsulant can be lifted easily, then the patch test fails.

Soundness Method. For the soundness method, the inspector should attempt to pull the wallboard square away from the painted surface. If the paper backing of the wallboard remains on the adhesive of the painted surface of the patch, the test is a success. The patch test fails if the adhesive is removed from the surface of lead-based paint or if the paint film splits. Failure at the adhesive/wallboard interface can perhaps be overcome by the use of a different surface preparation procedure, as discussed below for the encapsulant patch test.

If failure occurs in any of these procedures, it is important to carefully examine the back of the delaminated portion of the patch in order to determine if the failure occurred at the encapsulant/paint film interface or in an underlying layer of paint. As discussed below, encapsulation may still be suitable – with a different system or surface preparation – when the failure is interfacial but not when the failure is within the old paint film. It may be difficult to determine the locus of failure if the paint layers and the encapsulant coating are similar colors.

If a failure occurs, one of the following courses of action must be taken, depending on the cause of failure:

- **The adhesion between two underlying layers of paint failed, causing delamination.** Check for this condition by examining the back of the delaminated portion of the patch for signs of paint. This result indicates a layer of paint that bonded poorly and does not have sufficient adhesion. Poor bonding between underlying layers may be due to inadequate deglossing, poor quality paint, or incompatible coatings. These conditions are usually not correctable. Since multiple patch tests are recommended, complete all patch tests before deciding upon a plan of action. The encapsulant should not be used on a surface or component that has failed patch tests.

- **The adhesion between the paint and the base substrate failed.** Check for this by looking for signs of bare substrate and paint adhering to the back of the delaminated portion of the patch. Failure may be due to a painting history that has included so many layers of paint that the weight of the paint plus the encapsulant has begun to weaken the bond between the paint and the substrate. Moisture can also cause this type of failure. This is usually not correctable, and the encapsulant should not be used.

- **The adhesion between the encapsulant coating and the top layer failed.** Check for this by examining the back of the delaminated portion of the patch for lack of paint. Failure may be due to:

— Application of the encapsulant to a glossy surface without adequate deglossing. It may be possible to degloss the surface using a different technique and apply a second patch test to a different area on the same component. Wet sanding is permitted to degloss but not dry sanding.

— Inadequate curing time or improper curing conditions. Manufacturers' recommendations for curing and application conditions should be consulted.

— Application of the encapsulant to a dirty or greasy surface. The surface must be recleaned, and possibly deglossed before a second patch test is tried.

— Application of material to excessive thickness. This can cause failure due to internal stresses that cause the coating to pull away from the substrate. The applicator should be trained according to the manufacturer's instructions and a wet film or dry film thickness gauge (sometimes referred to as a "mil" gauge) should be used during application.

FIGURE 13.4 Encapsulant failure.

Evaluation of Adhesively Bonded Flexible Surface Covering Tests. A successful patch is one that cannot be easily removed. If the patch cannot be removed, the covering will have to be installed over the patch. In such a case, a smaller patch in an inconspicuous place will minimize the irregularity in the appearance of the finished product (see Figure 13.4).

7. Documentation of Patch Test Results

Patch testing may involve multiple patches on multiple surfaces. Therefore, documentation is very important to be sure that the correct encapsulant systems (including surface preparation) are applied to the target surfaces. If multiple patch tests are performed in a dwelling, it is recommended that a schematic drawing be used to indicate the locations of the patches. Form 13.1 can be completed for this purpose.

VII. Application and Installation of the Encapsulation Systems

Upon successful completion of a patch test, the encapsulant system can be applied or installed to the targeted surface. The steps for a proper application of an encapsulant system are summarized in Table 13.3.

A. Surface Preparation for Job

The surface preparation must be the same one that was used in the successful patch test and should be conducted with the same thoroughness and level of effort. The process of repairing components and preparing surfaces for the application and installation of encapsulants can generate leaded dust and debris, so precautions must be taken. Take precautions based on the methods used. The appropriate Worksite Preparation Level should be selected from Chapter 8.

Repair of defective surfaces or components may also be necessary. The encapsulant manufacturer should be asked to provide recommendations for caulk and other filling compounds that are compatible with the encapsulant. To minimize future crack formation in the encapsulant, these materials should match the expansion characteristics of the encapsulant and be compatible with the existing coatings.

Table 13.3 Steps for Obtaining Proper Application and Installation of an Encapsulant System.

Step	Description
Test substrate.	Complete patch test and other prejob procedures.
Develop job specification.	Prepare complete job specifications. Describe all work to be done. Include all job requirements (e.g., quality of surface preparation, dry film thickness). Reference standard procedures or equipment to the extent possible to avoid misunderstandings.
Hold pre-job conference.	Establish common understanding of amount and quality of work to be done among owner/specifier, contractor, and inspector. For example, all parties should agree on the extent of surface preparation. Document any changes in writing to avoid future disputes. The contractor should be prepared to provide work (scheduling) plans, worker safety plans, lists of materials and the amounts to be used, material manufacturer's written technical data sheets, application instructions, MSDS, test reports, and other information required in the job specification.
Conduct inspection.	Inspect coating operations. This is essential in obtaining a durable encapsulant system. The inspector should record all inspection data in a daily logbook. Suggested "inspection checkpoints" are described in Section C.2.
Perform final inspection.	Conduct final clearance testing as described in Chapter 15.

For large jobs, it is advisable to have an encapsulant manufacturer's representative onsite to provide additional information on repair and surface preparation. When the repair work and the surface preparation have been completed, the surface should be inspected prior to application and installation of the encapsulant. Once the encapsulant is applied, it becomes impossible to fix a poor surface preparation or, in the case of a failure, to confirm that surface preparation was done properly.

B. Installation and Application of Encapsulant System

1. Non-reinforced and Reinforced Coatings

The application procedures and requirements depend upon the specific product type. The same application method should be used for the targeted surface that was used in the patch test.

Several safety considerations are important in application: the applicator must have the appropriate MSDS documentation; personal protective equipment may be needed and must be in compliance with NIOSH or OSHA regulations; and areas need to be properly ventilated.

Masking procedures should be carried out, as needed. Surfaces to receive masking tape or other masking materials should be clean and free from dirt, dust, grease, and oil to ensure

Form 13.1 Encapsulant Patch Test Documentation.

Name of Person Performing Patch Test _____

License or Certificate Number (If Applicable) _____

Complete Address of Dwelling _____

Date Patch Test Applied _____ Curing Time _____

Date of Patch Test Evaluation _____

Temperature During Application and Curing _____

Humidity During Application and Curing _____

Room	Surface Location	Substrate	Type of Patch Test (X-cut or Adhesive Wallboard)	Surface Preparation	Name and Formulation of Encapsulant	Observations	Pass/ Fail

good contact. Loose edges of masking materials should be secured to avoid "flyaway," if spray application is being used. The time between coating application and masking material removal may depend upon the specific encapsulant being used.

The required environmental conditions for application depend upon the specific encapsulant being used. The manufacturer's specifications should be followed. As noted previously, water-based systems generally should not be applied to substrates when temperatures are below 40°F or above 95°F and the relative humidity is above 85 percent. For all encapsulants, application should be done only when the surface is dry and the temperature of the target surface is above the dew point.

Additional mixing and/or thinning of liquid encapsulants may be needed and should be done in accordance with the manufacturer's directions. Excessive thinning can cause premature failure. For two-component coatings, it is essential that the proper ratio of materials be mixed according to the manufacturer's directions. Not all two-component products are to be mixed together in the same ratio. Two-component materials will have a limited "pot life." That is, once the two components are mixed, a chemical reaction begins that can be slowed, but not stopped, by cooling. This means that the user has a limited period of time, i.e., pot life, in which to apply the product and to clean tools. Two-component coatings may also have an "induction time" requirement. This is a period required after mixing but before application to allow time for initiation of the reaction between the two components.

Encapsulants should be applied according to the manufacturer's recommended thicknesses. Wet film thickness gauges (sometimes called mil gauges) should be used to ensure proper film thickness. An encapsulant layer that is either too thick or too thin can cause premature failure.

Reinforced liquid encapsulants can require the use of a fabric. The manufacturer's recommendations for application of the fabric and procedures for seaming should be followed.

For liquid coatings, cure times vary from product to product and can depend upon atmospheric conditions. Thick elastomeric coatings may take only a few hours to be dry to the touch, but it may take several weeks for their mechanical properties to reach optimum values. The time for two-component coatings to cure depends upon temperature but is generally about a day.

2. Adhesively Bonded Coverings

Adhesively bonded wall coverings are installed in a manner similar to that used for vinyl wall coverings (NBS, 1973). No special tools are required. The typical three-step procedure is to apply adhesive with a roller; align and trowel the covering over the adhesive; and apply the topcoat, if needed. There are two options for coloring. The adhesive can be tinted the same color as the topcoat, which ensures two coatings with color, or two topcoats with color can be applied over untinted adhesive.

Some product manufacturers do not supply specific adhesive and topcoat products but only provide recommendations for choosing these products. Generally, there are two types of adhesives – "permanent" clay-based adhesives and water-based, heavy duty, but strippable adhesives. Since the permanent clay-based adhesive is more durable, it is preferred for lead-based paint encapsulation. However, removal of a wall system is difficult, if not impossible,

when the permanent adhesive is used. Water-based adhesives are more easily removed than permanent adhesives but may blister and fail when they come in contact with moisture.

Adhesively bonded floor tile should be installed according to the manufacturer's directions. If new subflooring is installed, then the tile/subfloor system constitutes an enclosure. If adhesion alone is used, the tiles constitute an encapsulant.

C. Inspection of Encapsulant Systems

Proper application and installation of encapsulant systems requires that the surface preparation and application procedures are carried out according to the manufacturers' recommendations and in accordance with the job specifications, if any. Monitoring of surface preparation and application is essential, in addition to conducting the final clearance examination. (See Table 13.3.)

1. Tools

Tools that may be required are a dark cloth to check for chalk removal, copies of referenced surface preparation standards, wet film and dry film thickness (measured in mils, or 10 micrometers)) gauges, a moisture meter, surface and air thermometers, a relative humidity meter, pressure gauges, a timepiece, and an illuminated viewing device. A logbook should be used to record all inspection data.

2. Procedures

Surface preparation and application inspection checkpoints and procedures are listed below:

- Prior to start of job – check equipment and encapsulant material.
- After preliminary cleanup and readying of the area prior to surface preparation – check for containment, protection of belongings and property, and completion of surface repairs, such as caulking.
- After surface preparation – ensure that the surface has been prepared in accordance with the specification and in the same manner as used in the patch test.
- For liquid encapsulants, just prior to material application – observe mixing and thinning, if any, for compliance with manufacturer's written instructions. Ensure that mixing ratio of two-component coatings is correct.
- During application of encapsulant – check environmental conditions (temperature, relative humidity, etc.). For liquid coatings, check wet film thickness, color of material (different colors should be required for different coats), and cure of previous coat before application of next coat for compliance with manufacturer's written instructions.
- After job completion – check dry film thickness and cure of liquid-applied coatings and appearance for all encapsulants.

VIII. Ongoing Monitoring and Reevaluation

Because of the limited experience with the use of encapsulant systems and because of their dependence upon the integrity of a lead-based paint film, the property owner or manager must arrange for regular monitoring and repairs, as needed. Visual monitoring should be performed 1 month and 6 months after application and no less often than every two years thereafter. If signs of wear or deterioration are apparent during any reevaluation examination, the monitoring should be increased to a quarterly basis for the next 6 months, then annually thereafter. In addition, residents should be instructed to notify management of the need for repairs on a timely basis. In some cities and States, regulatory reexaminations may be required, including sampling of settled dust for lead analysis. For example, as of the publication of these *Guidelines*, the Maryland Department of the Environment had the authority to inspect dwellings for a period of 1 year following application of an encapsulant. This is because the use of encapsulants is approved on a case-by-case basis, and the reevaluation provides a means of documenting their performance (Maryland, 2002).

For HUD-assisted housing that is subject to periodic reevaluation, monitoring of the performance of the encapsulation is recommended to be part of that reevaluation in order to determine if deterioration or failure of the encapsulation has occurred. Reevaluation is required if failure of encapsulation has been found during visual assessments or other observations by maintenance and repair workers since the previous reevaluation (see 24 CFR §35.1325 and § 35.1355(b). If failure of encapsulation has been found, the encapsulation shall be repaired, or abatement or interim controls shall be performed.

IX. Recordkeeping

The owner and contractor should both maintain documentation of interim control or abatement measures. Because the lead is not removed, appropriate protective measures must be taken if the encapsulant fails or if the building is renovated or demolished. Although it would be possible to label existing lead-based painted surfaces prior to encapsulation, the warning would likely be hidden, since it would be covered by the encapsulant. A chemical reaction between the marking substance and the encapsulant could cause the encapsulant to fail. Therefore, drawings showing locations of lead-based paint should be mounted on a wall of a basement, storage closet, or utility room. Records of both the initial installation and reexaminations should be provided to a new owner at the time of property transfer. See Appendix 6 for disclosure rule requirements.

The following information describing the initial application should be included with the drawings kept in the building:

- Type of encapsulant and product name.
- Exact location of encapsulant.
- Product label and/or copy of manufacturer's technical product information.
- MSDS for all products used.
- Contractor name.
- Date of application.

The owner or local agency should keep the visual monitoring document. Each document should include the name of the person performing the periodic visual monitoring, the date of the visual monitoring, the condition of coating and signs of wear or deterioration, and results of any leaded dust tests performed. If failure was observed during visual assessments or other observations by maintenance and repair workers, or during periodic monitoring and reevaluation, the reasons for failure (if known), corrective actions recommended or taken to repair failures, and any other information pertinent to the maintenance of the encapsulant should be included. Form 13.2 may be used for this purpose.

Form 13.2 Lead-Based Paint Encapsulation Visual Monitoring Form

Name of Person Performing Visual Monitoring _____

License or Certificate Number (If Applicable) _____

Complete Address of Dwelling _____

Date Encapsulant was Applied _____

Date of Last Evaluation _____

Today's Date _____

Room	Surface Location	Substrate	Name and/or Formulation of Encapsulation	Observations	Pass/ Fail

Signature _____

Printed Name _____

References

HUD, 1991. U.S. Department of Housing and Urban Development, *The HUD Lead-Based Paint Abatement Demonstration (Federal Housing Administration)*, prepared by Dewberry & Davis, HC–5831, Washington, DC.

HUD, 1990b. U.S. Department of Housing and Urban Development, A Comprehensive and Workable Plan for the Abatement of Lead-Based Paint in Privately-Owned Housing: A Report to Congress, Washington, DC, December 7, 1990.

Maryland DER, 2002. *Procedures for Abating Lead Containing Substances from Buildings*, COMAR 26.02.07, Title 26, Maryland Department of the Environment Regulations, Baltimore, Maryland.

NBS, 1973. National Bureau of Standards, U.S. Department of Commerce, *FlexiWall Systems Features and a Comparison of Its Advantages Over Other Systems per National Bureau of Standards Tests*, NBS Technical Note 808, Washington, DC. [Now known as National Institute for Standards and Technology, or NIST.]

APPENDIX D

HUD Visual Assessment Forms

Form 5.2 Report of Visual Assessment (for Lead Hazard Risk Assessment).
Form 6.0 Report of Visual Assessment (for Ongoing Lead-Safe Maintenance).

Property address _____ Apt. No. _____Page ____ of ____

Name of property owner _____

Name of risk assessor _____ Date of assessment ____ /____ /____

Area Description		Deteriorated Paint			Friction or Impact Surface? (F or I)	Visible Teeth Marks? (Y or N)	Paint Testing Results (Use codes below)[4]	Notes [e.g., paint testing (e.g., XRF, lab analysis) indicates paint is or is not lead-based paint; cause(s) of hazard control failures]
Location of Building Component, Dust or Bare Soil	Building Component, Dust, or Bare Soil Play Area/ Non-Play Area	Area (sq. ft.)	Is Area Small?[2] (Y or N)	Probable Cause(s) of Deterioration if Known[3]				

[1] Include room equivalent or exterior side or wall, as appropriate.

[2] Lead-safe work practices and clearance/cleaning verification are not required if work does not disturb painted surfaces that total more than

- For assisted housing: HUD's *de minimis area* of: 20 ft² or less on exterior surfaces, 2 ft² or less in any one interior room or space, or 10 percent of the total surface area on an interior or exterior type of component with a small surface area (such as trim, window sills, baseboards);
- For unassisted housing, and for child-occupied facilities, EPA's minor repair and maintenance activities threshold of: 6 ft² or less per room; or 20 ft² or less for exterior activities; provided that no prohibited or restricted work practices were used and no window replacement or demolition of painted surface areas is to be done.

[3] Common causes of paint deterioration are: moisture (indicate source if apparent), mildew, friction or abrasion, impact, damaged or deteriorated substrate, and severe heat.

[4] Codes based on previous paint testing or lead-based paint (LBP) inspection: *Code 1*: Surface known to be LBP; *Code 2*: Surface known to be LBP; *Code 3*: Presumed to be LBP. If paint testing results are obtained on site, use this column to record the result. If a paint chip sample is sent to the laboratory, use this column to record the sample number (or other unique identifier) as a reference to another record containing the sampling data and laboratory results.

Form 6.1 Report of Visual Assessment of Bare Soil for Lead-Safe Maintenance

Property address _____

Name of visual assessor _____ Date _____

Type of Area (play or nonplay)	Location of Each Bare Soil Area (side of building and detailed description, or code from sketch plan)	Approximate Area of Bare Soil Area (in sq. ft. or approximate dimensions)	Notes

Site-Plan Sketch Showing Locations of Bare Soil

Form 13.2 Lead-Based Paint Encapsulation Visual Monitoring Form

Name of Person Performing Visual Monitoring _____

License or Certificate Number (If Applicable) _____

Complete Address of Dwelling _____

Date Encapsulant was Applied _____

Date of Last Evaluation _____

Today's Date _____

Room	Surface Location	Substrate	Name and/or Formulation of Encapsulation	Observations	Pass/ Fail

Signature _____

Printed Name _____