APPENDICES

Appendix A Shop Diagram

Appendix B Lead Sample Results

Appendix C Photographs

Appendix D References



July 13, 2010 Project No. 1061-03

National Guard Region North Industrial Hygiene Office 301 Old Bay Lane Havre De Grace, MD 21078-4003

Attn: Non-Responsive

Project: Army National Guard Readiness Center, Industrial Hygiene Evaluation

Glen Burnie Army National Guard Armory

1.0 - EXECUTIVE SUMMARY

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North to identify and measure the existence and extent of potentially hazardous operations or conditions at the Glen Burnie Army National Guard Readiness Center located at 14 Dorsey Road in Glen Burnie, Maryland. The purpose of this evaluation was to generate or to update a previous baseline evaluation so that employee exposure history can be provided to each civilian and military employee. The following industrial hygiene and safety programs were evaluated during this industrial hygiene evaluation performed by Bonus Environmental, LLC representative Jeff Walworth on May 10, 2010:

- Indoor Air Quality
- Use of items on the Hazardous Materials List
- Vehicle maintenance activities
- Lead Wipe & Air Sampling
- Illumination

- Ergonomics
- Evaluation of the physical condition of the facility in regards to peeling paint, asbestos containing materials, water damage or mold problems, and housekeeping practices.

The Glen Burnie Readiness Center is an Army National Guard armory comprised of offices, an assembly/drill hall, a kitchen, a fitness room, and a lounge. The point of contact for this facility was Sgt. Klingelhofer. Three (3) full-time administrative personnel are employed in the approximately 20,050 ft² facility. A shop diagram depicting the locations of the operations identified during this industrial hygiene evaluation is attached to this report as Appendix A.

The National Guard Bureau Region North Industrial Hygiene Office provided governmental furnished equipment and sampling media required to perform the industrial hygiene evaluation. Chain of custody forms for laboratories approved by the National Guard Bureau Region North Industrial Hygiene Office were provided with the sampling media. All samples collected during this industrial hygiene evaluation were sent to the National Guard Bureau Region North Industrial Hygiene Office approved laboratories for analysis.



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2.0 – LEAD SAMPLING

2.1 – Lead Wipe Sampling

Lead wipe sampling was performed according to the EPA method 600/R-93/200(M)-7420 (Atomic Absorption - Flame). Fourteen (14) wipe samples and one (1) field blank were sent under chain-of-custody procedures to AMA Analytical Services, Inc., an AIHA accredited laboratory located in Lanham, Maryland. The following table outlines the locations and analytical results for the lead wipe samples collected during this project

	Army National Guard – Glen Burnie Readiness Center										
	Lead Wipe Sample Results										
Sample #	Sample Date	Sample Area (ft²)	Sample Result (µg/ft²)								
GB-W-1	5-10-10	Field Blank		< 12							
GB-W-2	5-10-10	Drill/Assembly hall, SE corner, on top of circuit breaker box	0.111	140							
GB-W-3	5-10-10	Drill/Assembly hall, east side, top of storage cabinet	0.111	< 110							
GB-W-4	5-10-10	Drill/Assembly hall, north wall, top of ceramic tile ledge	0.111	290							
GB-W-5	5-10-10	Drill/Assembly hall, north corner, on floor	0.111	< 110							
GB-W-6	5-10-10	Drill/Assembly hall, SW corner, on floor	0.111	< 110							
GB-W-7	5-10-10	Kitchen (Rm 105), on prep table	0.111	< 110							
GB-W-8	5-10-10	Room 121, NE wall, northern unit ventilator air grill	0.111	< 110							
GB-W-9	5-10-10	Room 107, on top of bar table	0.111	< 110							
GB-W-10	5-10-10	Room 108, top surface of end table	0.111	< 110							
GB-W-11	5-10-10	Room 122 (north side – fitness room), north side, top of television	0.111	< 110							
GB-W-12	5-10-10	Room 122 (south side – conf. room), table surface	0.111	< 110							
GB-W-13	5-10-10	Room 201, top of file cabinet	0.111	< 110							
GB-W-14	5-10-10	Top of stairs to 2 nd floor, on ceramic tiles	0.111	< 110							
GB-W-15	5-10-10	Commander's office (Rm 206 on floor plan), desk surface	0.111	< 110							

Surface cleanliness threshold = $< 200 \mu g/ft^2$

2.2 – Lead Air Sampling

The purpose of lead air monitoring was to document task-specific activities and corresponding exposures to lead. Occupational Safety and Health Administration (OSHA) 29 CFR 1926.62 requires employers whose employees are exposed to lead in the work place, in any quantity, make a determination whether any employee's exposure exceeds the action level (AL) of 30 μ g/m³ or the maximum permissible exposure limit (PEL) of 50 μ g/m³ as 8-hour time weighted averages (TWAs). If employee exposures are less than 30 μ g/m³, training is required under the Hazard Communication 29 CFR 1926.59. Exposures that exceed the AL or PEL require the employer to comply with additional



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requirements, including air monitoring, additional training, and restricted work practices as outlined in OSHA 29 CFR 1926.62.

Representative fixed area sampling was conducted for potential airborne concentrations of lead in accordance with accepted Industrial Hygiene methods recognized by the National Institute for Occupational Safety and Health (NIOSH) and OSHA. Representative breathing zone samples were not collected from an employee performing administrative tasks. Any employees performing a specific task utilized the same work practices. Employees not monitored for exposure to airborne lead dust can assume to have the same exposure as the monitored employees performing the same task.

Lead exposure monitoring was performed in accordance with the EPA method 600/R-93/200(M)-7420 (Atomic Absorption - Flame) with SKC personal air sampling pumps calibrated to 2.0 liters per minute. All samples were collected on 37 mm diameter cassettes with mixed-cellulose ester filters. All sampling pumps were calibrated before and after each use to ensure volume accuracy. Two (2) samples and one (1) field blank were sent under chain-of-custody procedures to AMA Analytical Services, Inc., an AIHA accredited laboratory located in Lanham, Maryland. Analytical results of the lead wipe and air samples are attached to this report as Appendix B.

	Army National Guard – Glen Burnie Readiness Center Lead Air Sample Results												
Sample #	Sample Type	Sample Location	Flow Rate	Start	Stop	Vol.	Rpt. Limit (μg/m³)	Results (μg/m³)	8 hr TWA (μg/m³)				
May 10,	May 10, 2010												
GB-A-1	FB	Field Blank				0	3	< 3	N/A				
GB-A-2	IWA	Room 121, on Sgt. Non-Responsive's desk, east side of room	2.0	0856	1514	756	4	< 4	N/A				
GB-A-3	IWA	Room 122 (south end – conf room), center of room, on table	2.0	0903	1515	744	4	< 4	N/A				

PS = Personal sample, **IWA** = Inside work area, **N/A** = Not Applicable **Note**: The OSHA PEL of $50 \mu g/m^3$ is averaged over an 8 hr work shift

3.0 - PHYSICAL CONDITION OF FACILITY / PERSONNEL CONCERNS

3.1 - Lead Based Paint

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC performed a visual inspection of the facility in regards to lead based paint. Bonus Environmental, LLC identified several areas of peeling paint which could potentially pose a lead exposure hazard. These areas include the ceilings of room 107, Kitchen (room 105), room 201, and lesser localized damage in many rooms. Two (2) bulk sample paint chips were collected from the ceilings of rooms 107 and 201. The paint chip samples were sent under chain-of-custody procedures to AMA Analytical Services, Inc. located in Lanham, Maryland for analysis. Sample analysis has indicated that the paint chip samples contained detectable levels of lead. The paints are therefore considered to be lead based paint and all activities that involve lead based paints are regulated by OSHA Lead in Construction Standard, 29 CFR 1926.62. The OSHA Lead in Construction Standard



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does not assign a numerical value of which must be present within the paint to be considered lead based paint. Paints which contain any detectable level of lead shall be treated and handled as lead based paint. HUD defines lead based paint as having greater than 0.5% lead by weight. The paint chip samples collected during this industrial hygiene evaluation did not contain lead in excess of 0.5% by weight. Analytical results are attached to this report as Appendix B.

3.2 – Presumed Asbestos Containing Materials

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC performed a visual inspection to identify presumed asbestos containing materials (PACM) and, if found, to note their condition. Bonus Environmental, LLC did not identify any PACM that was considered to be in poor or damaged condition.

3.3 - Water Damage/Mold Growth

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC performed a visual inspection to report the location and perform an evaluation of any water damaged or visible mold problems. Water-damaged building materials were noted on the plaster walls and/or ceilings in the Kitchen (room 105), room 107, and on the block walls in room 201. It was reported to Bonus Environmental, LLC that mold growth on the shower ceramic tiles is a recurring event.

3.4 - Housekeeping

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC performed an evaluation of the housekeeping practices. Bonus Environmental, LLC found the housekeeping to be in good order.

3.5 – Employee Interviews

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC performed interviews and made observations to determine if the work activities being performed possessed any ergonomic concerns. Following the interviews and observations, no ergonomic and or indoor air quality concerns were identified, although Sgt. Klingelhofer did express concerns regarding the drinking water in the facility.

3.6 – Indoor Air Quality

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC measured temperature, relative humidity, carbon monoxide (CO), and carbon dioxide (CO₂) throughout the facility. A calibrated TSI Q-Trak Model 7565 Indoor Air Quality Monitor equipped with a Q-Trak Probe 982 was utilized to record indoor air quality measurements.

Carbon dioxide is a natural component of air and the amount of CO₂ in a given air sample is commonly expressed as parts per million (ppm). The outdoor air in most locations contains about 380 ppm carbon dioxide. Higher outdoor CO₂ concentrations can be found near vehicle traffic areas, industry and sources of combustion. The concentrations of CO₂ found in most offices are well below the OSHA Permissible Exposure Limit (PEL) of 5,000 ppm when averaged over an 8-hour time period for an industrial workplace. While levels below 5,000 ppm are considered to pose no serious health



July 13, 2010 Page 5

threat, studies have indicated that individuals in offices with elevated CO₂ concentrations tend to report drowsiness, lethargy and a general sense that the air is stale. Ventilation rates for office spaces are defined by various codes and standards. The most widely accepted standard is the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62. According to ASHRAE Standard 62.1-2007, CO₂ concentrations below 700 ppm above the outdoor level are considered to indicate adequate ventilation and provide human comfort. The CO₂ measurements collected during this industrial hygiene evaluation ranged from 404 ppm to 481 ppm and indicate adequate ventilation within the facility.

Carbon monoxide, also known as the "silent killer," is a colorless, odorless, poisonous gas that results from the incomplete burning of common fuels such as natural or liquefied petroleum gas, oil, wood or coal. When carbon monoxide is inhaled, it enters the blood stream and reduces the ability of the blood to carry oxygen to vital organs, such as the heart and brain. Because it is impossible to see, taste or smell the toxic fumes, CO can harm you before you are aware it is in your work area. At lower levels of exposure, CO causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea and fatigue. The effects of CO exposure can vary greatly from person to person depending on age, overall health and the concentration and length of exposure. The OSHA has established a PEL of 50 ppm. OSHA standards prohibit worker exposure to more than 50 parts of the gas per million parts of air averaged during an 8-hour time period. The peak CO level for employees is 200 ppm. The CO measurements collected during this industrial hygiene evaluation ranged from 0.2 ppm to 1.3 ppm. CO levels were well below the OSHA PEL during this industrial hygiene evaluation.

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC collected temperature measurements. Temperature measurements throughout the facility ranged from 64.3°F to 72.0°F and are considered to be within an acceptable range.

During the industrial hygiene evaluation of the Army National Guard Glen Burnie Readiness Center, Bonus Environmental, LLC collected relative humidity measurements. Relative humidity measurements throughout the facility ranged from 25.2% to 33.0% and are considered to be within an acceptable range. Indoor air quality measurements recorded during this industrial hygiene evaluation are summarized in the table below.

Army National Guard – Glen Burnie Readiness Center Indoor Air Quality Measurements										
Location	CO_2	CO	Relative	Temperature						
Locuiton	(ppm)	(ppm)	Humidity (%)	(°F)						
Outdoors, west side of building	379	1.5	24.7	60.3						
Room 105 (Kitchen)	481	0.7	31.7	64.3						
Room 107 (Clubhouse)	462	0.3	33.0	66.4						
Room 114	445	0.2	32.2	70.9						
Room 118	463	0.4	31.3	71.4						
Room 121	441	0.5	30.7	72.0						



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Army National Guard – Glen Burnie Readiness Center Indoor Air Quality Measurements										
Location	CO_2	CO	Relative	Temperature						
Locuiton	(ppm)	(ppm)	Humidity (%)	(°F)						
Room 101 (center of Drill hall)	433	1.1	29.2	70.2						
Room 122 (north side – fitness room)	404	1.0	31.4	69.7						
Room 204	473	1.3	26.4	69.4						
Room 206 (room 204 on floor plan)	434	1.0	26.8	69.8						
Commander's office (room 206 on floor plan)	412	0.8	25.2	70.3						

Required/Recommended Values

CO₂ - OSHA PEL = 5,000 ppm and ASHRAE Standard 62.1-2007 = no greater than 700 ppm above outdoor

CO - OSHA PEL = 50 ppm and OSHA Ceiling Limit = 200 ppm

Temperature - ASHRAE Standard 55-2004 = between approximately 67 and 82 °F.

RH - ANSI/ASHRAE Standard 62.1-2007 = <65%

4.0 – LIGHTING

Utilizing a properly calibrated Cooke Corporation cal-Light 400 light meter, Bonus Environmental, LLC collected illumination readings throughout the facility. Illumination measurements recorded during this industrial hygiene evaluation are summarized in the table below.

Army National Guard – Glen Burnie Readiness Center Lighting Survey										
Location	Measurement in Foot Candles	Requirement in Foot Candles	Requirement Met?							
Rooms 103, 103A, 103B, 103C	1001 001111105	Inaccessible	1,100.							
Rm. 104		Inaccessible								
Room 111		Inaccessible								
Room 116		Inaccessible								
Room 115		Inaccessible								
Room 119		Inaccessible								
Room 109		Inaccessible								
Room 203	Inaccessible									
Room 102 – Storage garage (1 of 4 bulbs burned out)	4.3	30	NO							
Room 105 – Kitchen	19.2	10	YES							
Room 106 – Furnace room	27.3	30	NO							
Room 107 – Clubhouse	2.7	30	NO							
Room 108 – Lobby	10.9	5	YES							
Room 112 – Restroom (room 113 on floor plan)	68.7	5	YES							
Room 113 – Closet (room 112 on floor plan)	63.6	30	YES							
Room 114 – Office	106.8	50	YES							
Room 118 – Office	51.7	50	YES							
Room 117 – Restroom	12.2	5	NO							
Hallway outside of room 117	11.4	5	YES							
Room 121 – Office	32.0	50	NO							
Room 101 – Drill hall	4.2	30	NO							
Room 122, north end – Fitness room	17.0	30	NO							
Room 122, south end – Conf. room	109.8	30	YES							



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Army National Guard – Glen Burnie Readiness Center Lighting Survey										
Location	Measurement in	Requirement in Foot Candles	Requirement Met?							
D 201 Ct	Foot Candles									
Room 201 – Storage	38.7	30	YES							
Room 205 – Office (room 202 on floor plan)	53.8	50	YES							
Room 206 – Restroom & showers (room 204 on floor plan)	36.9	5	YES							
Hallway outside of room 206	15.6	5	YES							
Room 209 – Office (room 207 on floor plan)	89.1	50	YES							
Commander's office (room 206 on floor plan)	11.5	50	NO							

Lighting levels were compared to the levels outlined within the ANSI/IESNA RP-1-04 Office Lighting Handbook, and the ANSI/IESI RP-7-01 Lighting Industrial Facilities Handbook. Areas within the facility which did not meet the foot candle requirements are identified with a "NO" within the Requirement Met? column. It is recommended that illumination be improved in all the areas that did not meet the requirements. Improving illumination can be achieved by replacing burned-out lamps/bulbs, cleaning fixtures, relocating detailed work activities to more illuminated areas, and using supplemental task lighting.

5.0 - CONCLUSION

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North to identify and measure the existence and extent of potentially hazardous operations or conditions at the Glen Burnie Army National Guard Readiness Center located at 14 Dorsey Road in Glen Burnie, Maryland. The purpose of this evaluation was to generate or to update a previous baseline evaluation so that employee exposure history can be provided to each civilian and military employee. An industrial hygiene evaluation of the facility was performed by Bonus Environmental, LLC representative Jeff Walworth on May 10, 2010:

Bonus Environmental, LLC recommends that any areas of concerns outlined within this report be evaluated to ensure the necessary actions are made. Following the completion of the industrial hygiene evaluation, Bonus Environmental, LLC found the following safety and/or indoor air quality conditions of the facility to be within acceptable levels/condition in regards to the following:

- Carbon Dioxide
- Carbon Monoxide
- Presumed Asbestos Containing Materials
- Ergonomics

- Temperature
- Relative Humidity
- Housekeeping

Air sampling was not conducted during this industrial hygiene evaluation for metal welding fumes, as this task was not performed during this industrial hygiene evaluation. It is recommended that air sampling be performed during the next scheduled industrial hygiene evaluation for metal welding fumes if welding activities are conducted within this facility.



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It has been a pleasure to be of assistance to you. Please contact us if you have any questions concerning this report or if we can be of any further assistance in any other environmental or occupational health matter.

Sincerely,



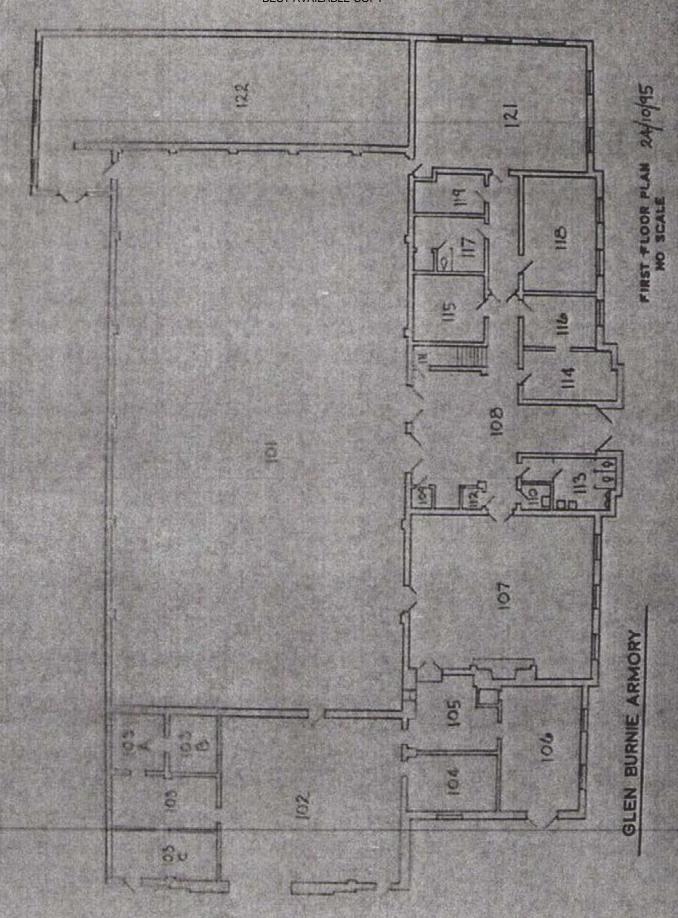
Principal Bonus Environmental, LLC

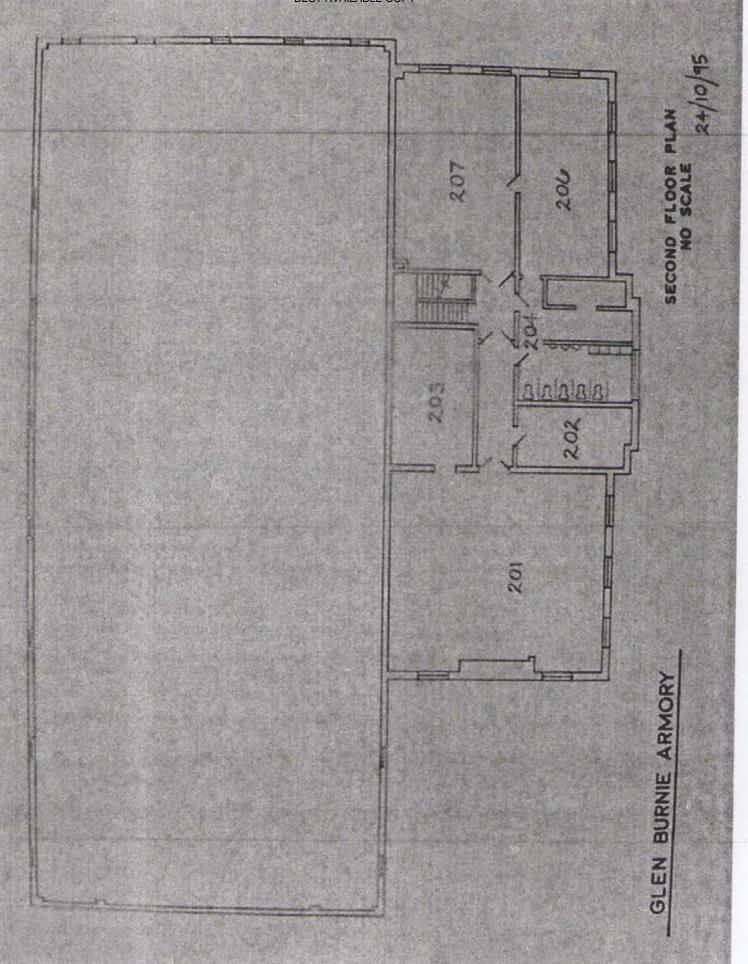


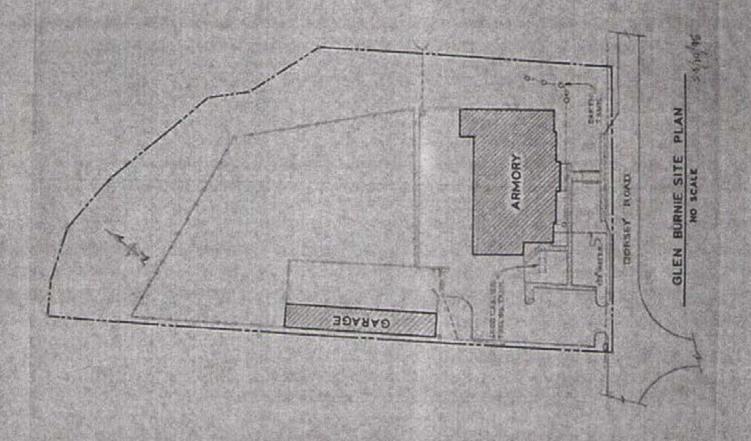
Principal Bonus Environmental, LLC

Appendix A

Shop Diagram







Appendix B

Lead Sample Results

AMA Analytical Services, Inc.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

100470

Client:

National Guard Bureau

Job Name:

Glen Burnie Armory

Chain Of Custody:

507101

NY ELAP

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Havre de Grace, Maryland 21078

Job Location:

Glen Burnie, MD

Date Submitted:

5/11/2010

5/18/2010

10920

State Military Reservation

Job Number: P.O. Number: Glen Burnie Armory W912K6-09-A-0003 Person Submitting: Date Analyzed:

Report Date:

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5/19/2010

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	> *>	orting imit	Total ug	Final Res	ult	Comments
1045995	GB-A-1	Flame	Air Blank	0	N/A	3	ug/m³		<3	ug	
1045996	GB-A-2	Flame	Air	756	N/A	4	ug/m³	<3	<4	ug/m³	
1045997	GB-A-3	Flame	Air	744	N/A	4	ug/m³	<3	<4	ug/m³	
1045998	GB-PC-1	Flame	Paint Chip	****	N/A	0.0085	%Pb		0.034	%Pb	
1045999	GB-PC-2	Flame	Paint Chip	****	N/A	0.009	%Pb		0.093	%РЬ	
1046000	GB-W-1	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	
1046001	GB-W-2	Flame	Wipe	****	0.111	110	ug/ft²	15	140	ug/fl²	
1046002	GB-W-3	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046003	GB-W-4	Flame	Wipe	****	0.111	110	ug/ft²	33	290	ug/ft²	
1046004	GB-W-5	Flame	Wipe	***	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046005	GB-W-6	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046006	GB-W-7	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046007	GB-W-8	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046008	GB-W-9	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/fl²	
1046009	GB-W-10	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046010	GB-W-11	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046011	GB-W-12	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046012	GB-W-13	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
1046013	GB-W-14	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/fl²	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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AMA Analytical Services, Inc.

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CERTIFICATE OF ANALYSIS



Client:

National Guard Bureau

Job Name:

Glen Burnie Armory

Chain Of Custody:

507101

NY ELAP

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Glen Burnie, MD

Date Submitted:

5/11/2010

10920

State Military Reservation

Havre de Grace, Maryland 21078

Job Number: P.O. Number: Glen Burnie Armory W912K6-09-A-0003

Person Submitting: Date Analyzed:

associated with these sampes.

samples.

5/18/2010

5/19/2010

Report Date:

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Reporting Limit	Total ug	Final Result	Comments
1046014	GB-W-15	Flame	Wipe	***	0.111	110 ug/ft²	<12	<110 ug/ft²	

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B

N/A = Not Applicable mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)

%Pb = percent lead by weight

ug = micrograms

ug/L = parts per billion (ppb)

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results

Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

Analyst: Nida McGarvey

Technical Manager:

See QC Summary for analytical results of quality control samples

NY ELAP accreditation applies only to paint chip, wipe, and soil

G Edward Carney

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This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) 4475 Forbes Blvd. • Lanham, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

Sheet 1 of 2 **CHAIN OF CUSTODY**

(Please Refer To This Number For Inquires)

Mailing/Billing Information:	Cubmittal Information.		Page 1/2
I. Client Name: National Guard Bureau	Submittal Information:	Burnie Armon	• '
2. Address 1; 301-IH Old Bay Lane	2. Job Location: Glen But	Mie, MD	
3. Address 2: Attn: NGB-AVN-SI, State Military Reservation	3 John Clas Report Any	40.4.1 DO 11 14040VE 00 4 0000	
4. Address 3: Havre de Grace, Maryland 21078	4. Contact Perso	© phone # (410) \$	942-0273
5. Phone #: (410) 942-0273 Fax #: (410) 942-0254	5. Submitted by	gnature: Non-Res	ponsive
	ults will be provided as soon as techni	cally feasible):	
	AL BUSINESS HOURS	REPORT TO	
☐ Immediate Date Due: ☐ Immediate ☐ 3 Day ☐ 24 Hours Time Due: ☐ ☐ Next Day ☐ 5 Day + 1	Results Required By N	Non-Responsive	VSENVIONMENTAL COM
Comments: Date Duc:	5-18-(0 Results Required By N (EveryAttempt Will Be Made to Accomodate)	US.2	army.mil
		US.8	army.mil
Asbestos Analysis TEM Bulk		Metals Analysis	
PCM Air - Please Indicate Filter Type: □ NIOSH 7400 (OTY)	ield(QTY)	Pb Paint Chip 2 (QTY) Pb Dust Wipe (wipe type 6 host)	15 (QTY)
Daviduol Ash	(QTY)	APh Air 🥕 (OTY)	(Q11)
TEM Air – Please Indicate Filter Type: □ AHERA (QTY) TEM Dust		☐ Ph Soil/Solid(QTY)	
□ NIOSH 7402 (OTV) □ Qual. (pres/abs) V:	icium/Dust(QTY)	☐ Pb TCLP(QTY) ☐ Drinking Water ☐ Pb(QTY) ☐ Cu	ACTIVAL ACTIVA
PLM Bulk QUAIN. (s/area) Vac	Utin D5755-95(QTY) D6480-99(QTY)	☐ Waste Water ☐ Pb(QTY) ☐ Cu	_(QT1)
☐ EPA 600 - Visual Estimate (OTY) TEM Water		☐ Pb Furnace (Media)	(QTY)
☐ EPA 600 - Visual Estimate (QTY) ☐ EPA Point Count (QTY) ☐ Qual. (pres/abs)	(QTY) (QTY)	Fungal Analysts Collection Apparatus for Spore Traps/Air Sar	welen.
☐ NY State Friable 198.1 (QTY) ☐ ELAP 198.2/EPA ☐ Grav. Reduction ELAP 198.6 (QTY) ☐ EPA 100.1	(OTY)	Collection Media.	npies:
U Other (specify) (QTY)	ed in good condition unless otherwise noted,	¬ U Spore-Trap(QTY) □ Surface V	acuum Dust(QTY)
MISC All samples received (TEM Water samples		(217) = (3110	D Genus (Media)(QTY) D Species (Media)(QTY)
U Asbestos Soil FLM_(Qual) PLM_(Quan) PLM/TEM_(Qual) FLM/TEM_(Quan)		☐ Other (Specify)(QTY)	7 species (Sieusi
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	* *		
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AMR Analytical Services, Inc.
Focused on Results www.amalab.com
AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) 4475 Forbes Blvd. • Lanham, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

Sheet 2 OF 2 **CHAIN OF CUSTODY**

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Page 3181 of 5269

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Appendix C

Photographs

July 13, 2010 Page 12



Site street sign



Peeling lead based paint in kitchen



Rm. 201, peeling lead based paint on ceiling



Building Exterior from the southeast



Rm. 107 (clubhouse), peeling lead based paint on ceiling



Rm. 201, water damaged block wall

<u>Appendix D</u>

References



July 13, 2010 Page 14

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1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 717.590.7031 Fax: 717.590.7936

www.complianceplace.com

Industrial Hygiene Survey Report

National Guard Facility Glen Burnie Readiness Center

Prepared For: National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location: Glen Burnie Readiness Center

14 Dorsey Road

Glen Burnie, MD 21061

Prepared By: Compliance Management International, Inc.

1215 Manor Drive

Suite 205

Mechanicsburg, PA 17055

Survey Date: July 25, 2013

Report Date: September 3, 2013



Senior Industrial Hygienist

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on July 25, 2013, at the Glen Burnie Readiness Center located at 14 Dorsey Road, Glen Burnie, MD 21061. The survey was performed by Mr. Non-Responsive.

- 1. Lead surface and air samples were collected. Sample results were below recommended guidelines and/or regulator standards. See Section 3.0 for detailed sampling results.
- 2. Lighting levels did not meet the American National Standards Institute/Illuminating Engineering Society of North America (ANSI/IESNA) recommended guideline in two locations measured. See Section 4.0 for detailed findings.
- 3. Indoor air quality (IAQ) parameters of temperature, relative humidity, carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment.
 - a. Temperature levels met the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 55-2010 recommended guideline of 68-79 °F in the areas sampled.
 - b. The relative humidity levels meet the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) TG 277 recommended guideline of 30-60% in the areas sampled.
 - c. Carbon monoxide (CO) levels were less than the National Ambient Air Quality Standard (NAAQS) recommended ceiling of 9 parts per million (ppm).
 - d. Carbon dioxide (CO₂) levels met the ASHRAE 62.1-2010 recommended guidelines for mechanically ventilated office buildings and commercial settings.

See Section 5.0 for detailed sampling results.

4. Suspect asbestos containing materials (ACM) 9"X9" floor tile and pipe insulation were observed to be intact and in good condition. See Section 6.0 for detailed findings.

Section 2.0 Operation Description & Observations

The Glen Burnie Readiness Center is mainly an administrative facility with a drill hall, offices, classrooms, and a converted firing range area (currently a classroom). There were approximately 5 full-time employees stationed at this facility at the time of this survey. There is no maintenance personnel assigned to the building.

The 20,050 square foot building is reported to have been built in 1954. It is a two story structure. There was an attached single bay garage at the facility that is no longer used for vehicle maintenance. A large vault had been installed in the garage with the remainder of the garage used as storage. The exterior is brick and block. The interior walls are block, plaster and drywall. The floors are concrete, 12"x12" floor tiles, wood, concrete and carpet.

The heating system is oil forced hot water unit. There were portable and unit ventilator air conditioning in some areas.

There is no child-care facility in the building.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared to be properly designed. Personnel had supportive chairs.

This facility has a converted firing range (CFR) that is now used as a classroom.

Suspect asbestos containing material (ACM) 9"X9" floor tile and pipe insulation was observed to be intact and in good condition.

Chipped and peeling paint was observed in the kitchen and in the wall locker storage room. The peeling paint was on the ceiling in both locations.

Housekeeping is adequate.

It was reported that the building had a new roof installed about a year ago. It was reported that a current roof leak is located on one side of the garage door.

Section 3.0 Lead Testing

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the American Society for Testing and Materials (ASTM) E 1792 protocols. Air samples were collected using 0.8 micrometer (um) mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using Environmental Protection Agency (EPA) Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample	Logation	Air	Surface	Bulk
#	Location	ug/m ³	ug/ft ²	%
1	Drill Hall	<18	*	*
2	Converted Firing Range/Classroom	<18	*	*
3	Drill Hall - Floor	*	<110	*
4	Drill Hall – Top of Electrical Panel	*	<110	*
5	Drill Hall – Top of Table	*	<110	*
6	Kitchen – Top of Microwave	*	<110	*
7	Kitchen – Top of Ice Machine	*	<110	*
8	Drill Hall – Floor by Entrance to	*	<110	*
0	Converted Firing/Classroom Range			,
9	Converted Firing Range/Classroom –	*	<110	*
9	Carpet Floor			•
10	Converted Firing Range/Classroom –	*	<110	*
10	Top of TV			
11	Converted Firing Range/Classroom –	*	<110	*
11	Top of Printer			
12	Room 45 – Top of File Cabinet	*	<110	*
13	Room 107 – Top of Book Case	*	<110	*
14	Room 121 – Top of Desk	*	<110	*
15	Room 204 – Top of Wall Locker	*	<110	*
16	Blank - Wipe	*	<12	*
17	Blank - Air	<3	*	*
18	Kitchen Ceiling	*	*	0.083%
19	Wall Locker Storage Area Ceiling	*	*	0.095%
-	Criteria	50	200	0.5

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. $\mathbf{ug/ft}^2 = \text{micrograms per square foot}$
- 4. $ug/m^3 = micrograms per cubic meter$
- 5. **ug** = micrograms

Sources:

- 1. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges
- 2. OSHA 29CFR1910.1025 Lead Standard

The National Guard Bureau currently utilizes 200 micrograms per square foot (ug/ft²) as a benchmark for identifying lead-contaminated surfaces. This guideline is referenced in NG PAM 420-15 "Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges" as a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Lead surface and air samples were collected. The following is a summary of the sample results from this survey.

- Surface levels for lead were less than the recommended guideline of 200 ug/ft² in all locations sampled.
- Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 micrograms per cubic meter (ug/m³).
- Two lead bulk samples were collected from areas with peeling paint. Both samples were less than the lead based paint criteria.

Section 4.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400 Precision Light Meter (Serial No. 98082EL). The light meter was last calibrated in April 2013. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended	Sufficient
	(FC)	Lighting (FC)	Lighting
Drill Hall	20	10	Yes
Garage/Vault Storage Area	7.8	30	NO
Converted Firing			Yes
Range/Classroom	97.4	30-50	
Kitchen	34.0	50	NO
Lounge Room 107	13.1	10	Yes
Office 114	95.3	30-50	Yes
Office 115	55.2	30-50	Yes
Office 116	87.4	30-50	Yes
Office 118	54.1	30-50	Yes
Office 121	39.0	30-50	Yes
Room 209 Wall Locker			Yes
Storage Area	116.1	10	
Office 209-A	51.2	30-50	Yes
Office 205	59.2	3050	Yes
Room 204 Wall Locker			Yes
Storage Area	109.7	10	

Table Notes:

- 1. FC = Foot Candles
- 2. **Bolded** results did not meet listed criteria

Source: ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

The lighting levels did not meet the minimum recommended guideline in the kitchen and garage/vault storage area.

Section 5.0 Indoor Air Quality

Survey measurements were made for comfort parameters and ventilation (temperature, relative humidity, carbon dioxide, and carbon monoxide). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7575-X (Serial #1228008). The IAQ Meter was last calibrated in July 2012.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2010). ASHRAE specifies temperature ranges for human comfort (ASHRAE 55-2010). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60%.

The following table summarizes the measurements collected.

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Outdoors	81.7	25.2	433	0.0
Office 115	77.5	43.5	414	0.0
Criteria	68-79	30-60	<1.133	<9

IAQ Assessment Summary

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. (%) = percent relative humidity
- 4. ${}^{\circ}\mathbf{F} = \text{degrees Fahrenheit}$

Sources: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) 55-2010, 62.1-2010, Environmental Protection Agency (EPA) National Ambient Air Quality Standard (NAAQS) & The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation.

Summary of findings and recommendations:

- Temperature measurements met the recommended 68-79°F in all sampled areas.
- Relative humidity levels met the recommended guideline of 30 60 % in all sampled areas.
- Carbon dioxide levels were measured to evaluate building ventilation or the introduction of outdoor air into the building. The recommended ceiling is obtained by adding 700 ppm to the measured outdoor carbon dioxide level. For this survey, carbon dioxide levels did not exceed the recommended ceiling of

- 1,133 ppm (700 ppm + 433 ppm). This is an indication that outdoor air ventilation is adequate.
- Carbon monoxide levels measured were less than the recommended ceiling of 9 ppm. The recommended ceiling of 9 ppm referenced in the above table is the National Ambient Air Quality Standard for carbon monoxide
- A visual inspection was conducted throughout accessible portions of the facility to assess sources or pathways of factors potentially deleterious to IAQ. The following observation were noted:
 - 1. It was reported that there is a roof leak in the garage area beside the garage door.

Section 6.0 Suspect Asbestos Containing Building Materials (ACM)

Suspect (ACM) (asbestos containing material) was noted at the time of this survey:

Suspect asbestos containing material (ACM) 9"X9" floor tile and pipe insulation was observed to be intact and in good condition.

Inaccessible areas such as behind walls or crawlspaces were not inspected. ACM could potentially be present in these areas.

Section 7.0 Equipment

The following equipment was utilized during this survey. All sampling equipment was properly calibrated prior to use and verified for accuracy as applicable. See daily reports and calibrations logs for detailed information.

Equipment	Serial #	Calibration Date	Value
TSI QTrak IAQ Meter	1228008	7/2012	NA
Cal Light 400 Light Meter	98002EL	4/2013	NA
SKC Air Sampling Pump	LVP06	7/25/13	2.5 LPM
SKC Air Sampling Pump	767926	7/25/13	2.5 LPM

Section 8.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Compliance Management International, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report

AMA Analytical Services, Inc.



CERTIFICATE OF ANALYSIS

AIHA LAP, LLC ACCREDITED LABORATORY NOUSTRIAL HYGIENE, ENVIRONMENTAL LEAD & ENVIRONMENTAL MICROBIOLOGY ISOMEC 17025-2005 www.aihancoreditedlabs.org

LAB #100470

Client:

National Guard Bureau

Job Name:

ARNG-MD

Chain Of Custody:

516447

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Glen Burnic-RC

Date Submitted:

7/29/2013

State Military Reservation

Job Number:

Not Provided

Person Submitting:

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Date Analyzed:

7/31/2013

8/1/2013

Report Date:

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)		orting imit	Total ug	Final Res	ult	Comments
13080975	1	Flame	Λir	170	N/A	18	ug/m³	<3	<18	ug/m³	
13080976	2	Flame	Air	170	N/A	18	ug/m³	<3	<18	ug/m³	
13080977	3	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080978	4	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080979	5	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080980	6	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080981	7	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080982	8	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080983	9	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13080984	10	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080985	11	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13080986	12	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13080987	13	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080988	14	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13080989	15	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13080990	16	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	
13080991	17	Flame	Air	0	N/A	3	ug/m³	<3	<3	ug	
13080992	18	Flame	Paint Chip	****	N/A	0.01	%Pb		0.083	%Pb	
13080993	19	Flame	Paint Chip	****	N/A	0.0087	%Pb		0.095	%Pb	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AIHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



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516447

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Glen Burnie-RC

W912K6-09-A-0003

Date Submitted:

7/29/2013

State Military Reservation

Havre de Grace, Maryland 21078

Job Number: P.O. Number: Not Provided

Person Submitting: Date Analyzed:

7/31/2013

Report Date:

8/1/2013

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample

Client Sample

Analysis Type

Sample Type

Air Volume

Area Wiped

Reporting

Total ug

associated with these

samples.

Final Result

See QC Summary for analytical results of quality control samples

Comments

Number

Number

(L)

(ft2)

Limit

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7000B; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7010; Water: SM-3113B

N/A = Not Applicable

ug = micrograms

mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm) ug/L = parts per billion (ppb)

%Pb = percent lead on a dry weight basis

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results

Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Analyst:

Nida McGarvey / Kim Shipe

Technical Manager:

G Edward Carney

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AlHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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159202

1 of 2

210 REV. 6.08



(CUSTODY)

4. Comments:

AMA Analytical Services, Inc.
Focused on Results www.amalab.com
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4475 Forbes Blvd. • Lanham, MD 20706
(201) 450-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

516447

Page 3202 of 5269

Mailing/Billing Information:					Submi			tion:	10		No. 1	^			
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						3. Job#:4. Contact Perso Non-Respondence						_ P.C	#: W912K6-09-		
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4. Comments:

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Appendix B. Photographs



Exterior of facility



Drill Hall



Converted range area now a classroom and weight room



Suspect asbestos pipe insulation in good condition



Suspect asbestos floor tile in good condition

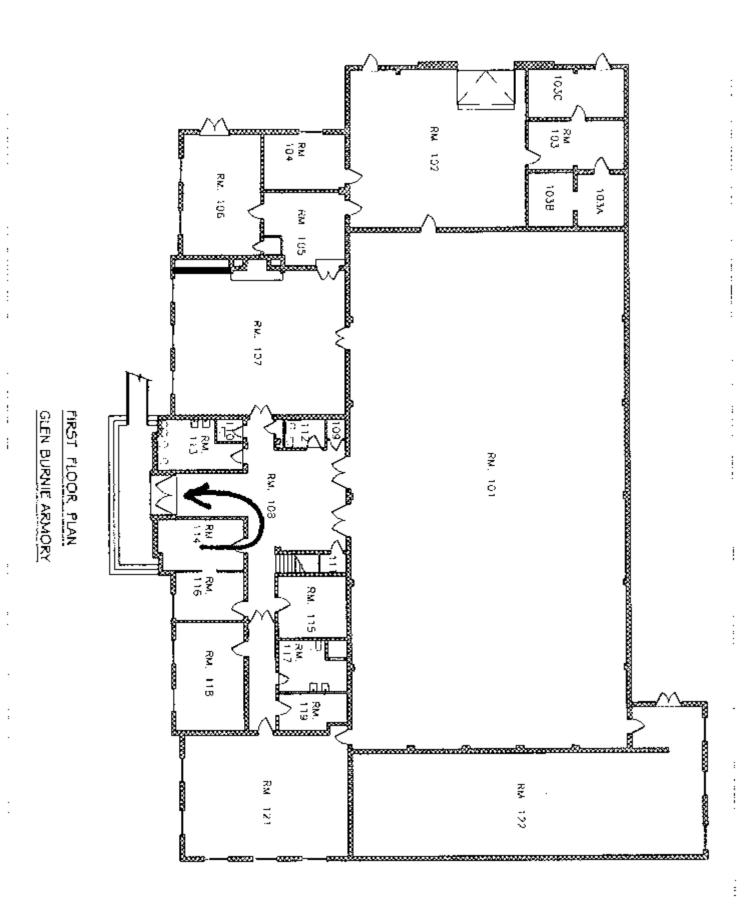


Kitchen ceiling peeling paint



Second floor wall locker storage area peeling paint on ceiling

Appendix C. Floor Plan





1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 215.699,4800

Fax: 215.699.8315

Daily Notes

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Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead.
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) -Threshold Limit Values and Biological Exposure Indices, 2013 Edition.
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition.
- 4. American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Ventilation for Acceptable Indoor Air Quality, 62.1-2010.
- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. National Ambient Air Quality Standards (NAAQS) National primary ambient air quality standards for carbon monoxide 40 CFR 50.8.
- 9. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227 (h) (3)].
- 10. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM).
- 11. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, February 2002.
- 12. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 Nov 06.
- 13. ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy, 55-2010.

May, 2018

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US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

MAY 0 9 2007

MEMORANDUM FOR National Guard Bureau Region North Industrial Hygiene Office (NGB-ARS-IHNE/Ms. Non-Responsive), 301-IH Old Bay Lane, Havre de Grace, MD 21078

SUBJECT: Maryland Army National Guard Facilities, Industrial Hygiene Baseline Survey, Report No. 55-ML-01ED-03/07, MG (Brevet) John R. Kenly Armory, Greenbelt, MD, 13 August 2003

- 1. Enclosed is the final copy of the subject report and two CD-ROMs.
- 2. Our point of contact is Ms. Non-Responsive, at commercial (410) 436-5475/3118, DSN 584-5475/3118 or electronic mail: Non-Responsive @us.army.mil

FOR THE COMMANDER:

Non-Responsive

Encl

Director, Occupational Health Sciences

CF: (wo/CD-ROMs)
USACHPPM-NORTH (MCHB-AN-IH/MR. Non-Responsive

Readiness thru Health

Printed on Recycled Paper

U.S. Army Center for Health Promotion and Preventive Medicine



MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEY REPORT NO. 55-ML-01ED-03/07 MG (BREVET) JOHN R. KENLY ARMORY GREENBELT, MD 13 AUGUST 2003















Distribution limited to U.S. Government agencies. Requests for this document must be referred to the National Guard Bureau Region North Industrial Hygiene Office (NGB-ARS-IHNE/ Ms. Vanessa Franchere), 301-IH Old Bay Lane, Havre de Grace, MD 21078

Readiness Thru Health

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World War II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed \$3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/ supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- ♦ Integrity is the foundation
- ◆ Excellence is the standard
- Customer satisfaction is the focus
- ♦ Its people are the most valued resource
- ♦ Continuous quality improvement is its pathway

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army Imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization fiercely proud of its history, yet equally excited about the future. It is destined to continue its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.

CHPPM FORM 433-E (MCHB-CS-IPD), OCT 03 (reverse)

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DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

EXECUTIVE SUMMARY
MARYLAND ARMY NATIONAL GUARD FACILITIES
INDUSTRIAL HYGIENE BASELINE SURVEY
REPORT NO. 55-ML-01ED-03/07
MG (BREVET) JOHN R. KENLY ARMORY
GREENBELT, MD
13 AUGUST 2003

- 1. PURPOSE OF EVALUATION. To conduct an industrial hygiene survey at the Maryland Army National Guard (MDARNG) MG (Brevet) John R. Kenly Armory, Greenbelt, MD to identify and measure the existence and extent of potentially hazardous operations or conditions. The survey will serve to establish a baseline so that a work history of exposures is provided for each civilian or military employee.
- 2. CONCLUSIONS. The significant health risks identified at the Armory were potential lead exposures from deteriorating paint and from incomplete decontamination of the former indoor firing range (IFR), deteriorated asbestos-containing floor tiles, and mold growth. Water quality should also be assessed.

3. RECOMMENDATIONS.

- a. Lead Exposure. Health Risk Assessment Code (RAC) 3. Establish and execute a lead hazard management plan, and take immediate corrective action where a possible lead-related health hazard has been identified. Repair and stabilize all deteriorated paint surfaces. Clean all areas in and adjacent to the former IFR immediately and other areas where sampling results showed elevated levels of lead. Follow the cleaning guidance in Appendix F of the report and in National Guard Pamphlet 420-15. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after cleanup. Address all potential lead hazards before continuing to extend the use of this facility to children. If children will continue to use this facility, clean surfaces to the Environmental Protection Agency lead in dust standard for young children of 40 micrograms per square foot ($\mu g/ft^2$) on floors and clean all remaining areas to the National Guard Bureau Region North Industrial Hygiene Office and United States Army Center for Health Promotion and Preventive Medicine recommended maximum level of 200 $\mu g/ft^2$ for lead in dust on all other surfaces.
- b. <u>Asbestos Exposure</u>. Health RAC 3 if abatement has not been done. Confirm that asbestos has been abated.

Readiness thru Health



- c. <u>Mold Exposure and Indoor Air Quality</u>. Health RAC 4. Repair the source of the water damage on the Recruiter's Office floor. Abate all areas of visible mold using the cleaning guidance in Appendix G. To reduce the moisture level in the air, increase ventilation in cooler weather and dehumidify damp spaces in warmer weather. Dehumidifying can be accomplished either by closing the windows and turning on window air conditioning units or by using a portable dehumidifier in the summer months. Evaluate indoor air quality in a future survey.
- d. <u>Water Quality</u>. No RAC can be assigned at this time. Test the drinking water from water fountains and faucets for lead and for any other potential contaminants that can be identified.

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May, 2018

MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEY REPORT NO. 55-ML-01ED-03/07 MG (BREVET) JOHN R. KENLY ARMORY GREENBELT, MD 13 AUGUST 2003

- 1. REFERENCES. See Appendix A.
- 2. PURPOSE. To conduct an industrial hygiene survey at the Maryland Army National Guard (MDARNG) MG (Brevet) John R. Kenly Armory, Greenbelt, MD to identify and measure the existence and extent of potentially hazardous operations or conditions. The survey will serve to establish a baseline so that a history of workplace exposures is provided for each civilian or military employee.
- 3. AUTHORITY. Fax, National Guard Bureau Region North Industrial Hygiene Office (NGB-ARS-IHNE/Ms. Non-Responsive), 28 February 2003, subject: SAB.
- 4. GENERAL.
 - a. Personnel Contacted. This information was not available.
- b. <u>Survey Personnel</u>. Ms. Non-Responsive, Industrial Hygienist, United States Army Center for Health Promotion and Preventive Medicine (USACHPPM) conducted this survey on 13 August 2003.
- c. <u>Risk Assessment Codes (RACs)</u>. The Department of Defense Instruction (DODI) 6055.1 provides a method for assigning RACs to health hazards that are based on the magnitude of exposures to physical, chemical, and biological agents and the possible medical effects. The DODI 6055.1 also provides RACs for safety and ergonomic hazards. A RAC is an expression of the risk associated with a hazard that combines the hazard severity and accident probability into a single numeral. The RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority.
- d. <u>Background</u>. The Armory mission was to support Company C, 1st Battalion, 115th Infantry Regiment, Battery B, 2nd Battalion, and 110th Field Artillery Regiment. The date of construction was 1954. Floor plan and photographs are in Appendices D and E respectively. The point of contact stated that children occupy the Armory one to two times per year for family support activities. However, numerous advertised community events indicated that children may visit the Armory more frequently.

5. METHODOLOGY.

- a. <u>Assessment Criteria</u>. Army Regulation 40-5 contains the requirement that airborne chemical exposures in Army facilities must comply with the lower of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) or the American Conference of Governmental Industrial Hygienists Threshold Limit Value. The National Guard Bureau (NGB) Industrial Hygiene Office criterion for lead in surface dust is discussed in Appendix C. The American Society of Heating, Refrigeration, and Air-conditioning Engineers publishes criteria for indoor air quality. The National Fire Protection Association National Fire Codes provides standards for fire and life safety. The Illumination Engineering Society North America provides standards for minimum light levels. The Environmental Protection Agency (EPA) provides standards for lead in drinking water.
- b. <u>Calibration</u>. All instruments were calibrated in accordance with manufacturers' instructions using National Institute of Standards and Testing traceable methods.
- c. <u>Methodology</u>. The survey consisted of the collection of indoor air quality and ventilation measurements, sampling surface dust and air for lead, observation of work practices and procedures, and employee interviews.

6. FINDINGS AND DISCUSSION

- a. <u>Description of Operations</u>. Activities at the Armory included drills, office work, and minor vehicle maintenance.
- b. <u>Occupational Safety and Health Programs</u>. There were no written occupational safety and health programs or records available at the Armory.

c. Building Condition.

- (1) Physical Condition. The building was in good condition, except for deteriorated asbestos-containing floor tiles and mold growth as discussed below.
 - (2) Housekeeping. No housekeeping deficiencies were observed.

d. Indoor Air Quality.

(1) Heating, Ventilation, and Air-Conditioning Systems. The building was heated by an oil-fired hot water system. Cooling was provided by several window-type air conditioners mounted in regularly used offices and by manual operation of windows.

- (2) Indoor Air Quality. The site measurements could not be located for this report. However, as noted below, mold growth in the Storage Room indicated inadequate control of humidity.
- e. <u>Water Quality</u>. Building occupants stated that the drinking water had never been tested and that they were concerned about the water quality.
- f. <u>Lead Hazards</u>. The age of the building indicated that the presence of lead in paint was likely. Many rooms in the Armory had extensive areas of deteriorated paint. Staff Sergeant (SSG) Non-Responsive, Environmental Compliance Assessment Coordinator for the State of Maryland Environmental Office, stated that the former indoor firing range (IFR) had been decontaminated. The former IFR was being used as a storage room at the time of the site visit.
- (1) Lead Criteria. The EPA and State of Maryland limits for lead in dust are 40 micrograms per square foot ($\mu g/ft^2$) on floors, 250 $\mu g/ft^2$ on windowsills, and 400 $\mu g/ft^2$ in window troughs. These limits apply to pre-1978 Army facilities only if children under 6 years of age occupy them for 60 or more hours per year. The NGB Region North Industrial Hygiene Office concurs with the USACHPPM recommended maximum level of 200 $\mu g/ft^2$ on floors and frequently contacted surfaces, which is more stringent for windowsills than the EPA/State of Maryland standards. This level was adopted from OSHA Compliance Letter 02-02-58. Further details are in Appendix C. The OSHA PEL for lead in air is 0.05 milligram per cubic meter averaged over an 8-hour day. The EPA and State of Maryland definition of lead-based paint (LBP) is a lead content of 0.5 percent or greater by mass.
 - (2) Lead Measurements. The laboratory report is in Appendix B.
- (a) Lead in surface dust. Results are shown in the Table. All sample results that were greater than or equal to $40 \,\mu g/ft^2$ for floors or $200 \,\mu g/ft^2$ for other surfaces are highlighted. Photographs of sample locations are provided in Appendix E. High levels of lead were found on the floor near the firing line and on the windowsill in the former IFR.
- (b) Lead in Air. General area sampling was conducted in the Orderly Room (six occupants), a classroom on the second floor, and the Recruiter's office. All results were below the laboratory reporting limit as well as the OSHA 8-hour time-weighted average PEL of 0.05 milligrams per cubic meter.
- (c) Lead in Paint. Deteriorated paint was sampled on the wall in the hallway near the Orderly Room and the Recruiter's Office, in the Orderly Room on the floor under the window in SSG office, and on the ceiling of the Drill Hall. Photographs of the first two sample locations are provided in Appendix E. The results ranged from 0.049 to 0.280 percent lead. None of the samples met the EPA and State of Maryland definition of LBP. However, deteriorated paint containing any detectable level of lead may pose a lead hazard.

TABLE. Lead in Surface Dust.

Wipe Sample #	Location of Samples	Conc. (µg/ft²)
GBW01	Orderly Room, desktop	<23
GBW02	Orderly Room, wall	<23
GBW03	SGT office, floor under window	<23
GBW04	Recruiter's Office, top of cabinet	<23
GBW05	Recruiter's Office, floor under window	<23
GBW06	Kitchen, table top	36
GBW07	Kitchen, top of icemaker	<23
GBW08	Former IFR, floor near bullet trap location	35
GBW09	Former IFR, floor near firing line	339
GBW10	Former IFR, window sill	287
GBW11	Second floor locker room, floor near window	<23
GBW12	Second floor locker room, top of cabinet	<23
GBW13	Supply Sergeant's Office, desktop	<23
GBW14	Lobby, floor near front doors	<23
GBW15	"Club" area, countertop	<23

g. Other Chemical Hazards.

- (1) Asbestos. There were asbestos-containing floor tiles throughout the facility. In the recruiter's office, several tiles were missing or cracked. The SSG Non-Responsive stated that asbestos abatement was planned for the January 2005 timeframe.
- (2) Mold. Mold was growing on the exercise equipment and table in the storage room. This appeared to be due to excessive air humidity. See Photographs 12 and 15, Appendix E. In the Recruiter's Office, a mat covered an area of the floor where tiles were missing or cracked. There was visible moisture under the mat, providing the potential for mold growth and for further damage to tiles. The most likely cause was leakage from heating pipes running under the floor at this location.
- h. <u>Industrial Ventilation Systems</u>. There were no industrial ventilation systems at the Armory.

- i. <u>Noise Hazards</u>. No operations with the potential to generate hazardous noise levels were identified.
- j. <u>Lighting</u>. All areas were visually judged to be adequately lit and no occupants reported areas of deficient lighting.
 - k. <u>Ergonomics</u>. No potential ergonomic hazards were observed or reported.
 - 1. <u>Safety Hazards</u>. No safety hazards were observed or reported.
- 7. CONCLUSIONS. The significant health risks identified at the Armory were potential lead exposures from deteriorating paint and from incomplete decontamination of the former IFR, deteriorated asbestos-containing floor tiles, and mold growth. Water quality should also be assessed.

8. RECOMMENDATIONS.

- a. <u>Lead Exposure</u>. Health RAC 3. Establish and execute a lead hazard management plan, and take immediate corrective action where a possible lead-related health hazard has been identified. Repair and stabilize all deteriorated paint surfaces. Clean all areas in and adjacent to the former IFR immediately and other areas where sampling results showed elevated levels of lead. Follow the cleaning guidance in Appendix F and in National Guard Pamphlet 420-15. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after cleanup. Address all potential lead hazards before continuing to extend the use of this facility to children. If children will continue to use this facility, clean surfaces to the EPA lead in dust standard for young children of $40~\mu g/ft^2$ on floors and clean all remaining areas to the NGB Region North Industrial Hygiene Office and USACHPPM recommended level of $200~g/ft^2$ for lead in dust on all other surfaces.
- b. <u>Asbestos Exposure</u>. Health RAC 3 if abatement has not been done. Confirm that asbestos has been abated.
- c. Mold Exposure and Indoor Air Quality. Health RAC 4. Repair the source of the water damage on the Recruiter's Office floor. Abate all areas of visible mold using the cleaning guidance in Appendix G. To reduce the moisture level in the air, increase ventilation in cooler weather and dehumidify damp spaces in warmer weather. Dehumidifying can be accomplished either by closing the windows and turning on window air conditioning units or by using a portable dehumidifier in the summer months. Evaluate indoor air quality in a future survey.
- d. <u>Water Quality</u>. No RAC can be assigned at this time. Test the drinking water from water fountains and faucets for lead and for any other potential contaminants that can be identified.

9. ADDITIONAL ASSISTANCE. For additional assistance or questions concerning this report, please contact the undersigned at commercial 410-436-3118, DSN 584-3118, or by electronic mail: Non-Responsive @us.army.mil

Non-Responsive

Industrial Hygienist USACHPPM Lead and Asbestos Team Leader Industrial Hygiene Field Services Program

APPROVED:

Non-Responsive

Program Manager Industrial Hygiene Field Services Program

APPENDIX A

REFERENCES

Literature Cited.

- 1. Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Administration, current edition. http://www.osha.gov/comp-links.html
- 2. Department of Defense Instruction (DODI) 6055.1, Department of Defense Occupational Safety and Health (OSH) Program, August 19, 1998. http://www.dtic.mil/whs/directives/corres/pdf/i60551 081998/i60551p.pdf
- 3. AR 40-5, Medical Service, Preventive Medicine, 22 July 2005. http://www.usapa.army.mil/pdffiles/r40_5.pdf
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- 5. DA PAM 40-503, Medical Services, Industrial Hygiene Program, 30 October 2000. http://www.usapa.army.mil/pdffiles/p40 503.pdf
- 6. American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs), ACGIH, Cincinnati, OH, 2005. http://www.acgih.org/TLV/
- 7. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality.
- 8. Illuminating Engineering Society of North America, ANSI/IESNA Standard RP-1-2004, American National Standard Practice for Office Lighting.
- 9. USACHPPM Interim Report No. 39-EJ-1157-99, Derivation of Wipe Surface Screening Levels for Environmental Chemicals, 1999.
- 10. OSHA Instruction, CPL 02-02-058 CPL 2-2.58 29 CFR 1926.62, Lead Exposure In Construction; Interim Final Rule-- Inspection and Compliance, Procedures, 1993. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1570

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MDARNG Facilities IH Baseline Surveys, MG (Brevet) John R. Kenly Armory, Greenbelt, MD, Report No. 55-ML-01ED-03/07,13 August 2003

- 11. U.S. Department of Housing and Urban Development (HUD), Technical Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing 1998. http://www.hud.gov/offices/lead/guidelines/hudguidelines/index.cfm
- 12. NG Pam 420-15, Facilities Engineering, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 Nov 06.

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APPENDIX B LABORATORY REPORT

RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD BY WIPE SAMPLING

RES Job Number:

RES 96611-1

Client:

Army National Guard IH - West

Client Project Number / P.O.: Client Project Description: Date Samples Received:

None Given Greenbeit, MD August 19, 2003

Analysis Type:

USEPA SW846 3050B / AA(7420)

Turnaround:

3-5 Day

Date Samples Analyzed:

August 26, 2003

Client 1D Number	Lab ID Number	Sample Area (sq.ft.)	LEAD (µg)	Detection Limit ()(g/sq.ft.)	LEAD CONCENTRATION (µg/sq.ft.)
GBBLANKI	EM 806480	0.11	BDL	23	BDL
GBW01	EM 806481	0.11	BDL	23	BDI.
GBW02	EM 806482	0.14	BDL	23	BDL
GBW03	EM 806483	0.11	BDL	23	
GBW04	EM 806484	0.11	BDL	2,3	BDL BDL
GBW05	EM 806485	0.11	BDL	23	BDL
GBBLANK2	EM 806486	11.0	BDL	23	BDI,
GBW06	EM 806487	0.11	4.0	23	
GBW07	EM 806488	0.11	BDL.	23	36
GBW08	EM 806489	0.11	3.8	23	BDI.
GBW09	EM 806490	0.11	37.3		35
GBW10	EM 806491	0.11	31.6	23	339
GBBLANK3	EM 806492	0.11		23	287
GBWH	EM 806493		BDI,	23	BDL
GBW12	•	0.11	BDL	23	BDL
GBW13	EM 806494	0.11	BDE	23	BDL
GBW14	EM 806495	0.11	BDL	2.3	BDL
	EM 806496	0.11	BDL	2.3	BDL
GBW15	EM 806497	0.14	BDL	23	BDL
GBBLANK4	EM 806498	0.11	BDL	2.3	BDL

^{*}Calculations Based On A I sq.ft. Sample Area Unless Otherwise Noted

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RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AJHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD IN PAINT

RES Job Number:

RES 96611-1

Client:

Army National Guard IH - West

Client Project Number / P.O.:

None Given Greenbelt, MD

Client Project Description: Date Samples Received:

August 19, 2003

Analysis Type: Turnaround:

USEPA SW846 3050R / AA (7420) 3-5 Day

Date Samples Analyzed:

August 26, 2003

Client 1D Number	Lab ID Number	Detection Limit (%)	LEAD CONCENTRATION (%)
GBBULK01	EM 806499	0.005	0.220
GBBULK02	EM 806500	0.005	0.280
GBBULK03	EM 806501	0.005	0.049

RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD IN PAINT

RES Job Number:

RES 96611-1

Client:

Army National Goard III - West

Client Project Number / P.O.: Client Project Description:

None Given Greenbelt, MD

Date Samples Received:

August 19, 2003

Analysis Type: Turnaround:

USEPA SW846 3050B / AA (7420)

3-5 Day

Date Samples Analyzed:

August 26, 2003

Client ID Number	Lah ID Number	Detection Limit (%)	LEAD CONCENTRATION (%)
GBBULKOI	BM 806499	0.005	0.220
GBBULK02	EM 806500	0.005	0.280
GBBULK03	EM_806501	0.005	0.049

APPENDIX C

PROPOSED ASSESSMENT CRITERIA FOR LEAD

Subject: National Guard Bureau Region North Industrial Hygiene Office Proposed Recommendations for Surface Lead in Armories

- 1. In armories that do not contain childcare facilities, the National Guard Bureau (NGB) Region North Industrial Hygiene Office recommends cleaning the areas in which sample results are greater than 200 micrograms per square foot ($\mu g/ft^2$). If a special function will be held in which children will be present in this facility, consider thoroughly cleaning the areas that will be accessible to children prior to the function. This guidance is based on professional judgment, risk assessments, adaptation of Occupational Safety and Health Administration (OSHA) guidance, and feasibility of cleaning to a certain level.
- a. Environmental Protection Agency (EPA) standards (40 Code of Federal Regulations (CFR) 745.227(h)(3)) are not directly applicable because they are criteria for dust-lead hazards developed for floors (40 µg/ft²) and windowsills (250 µg/ft²) in residential dwellings and child occupied facilities. A child occupied facility is defined as a building, or portion of a building, constructed prior to 1978, visited regularly by the same child, 6 years of age or under, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3 hours and the combined weekly visit lasts at least 6 hours, and the combined annual visits last at least 60 hours. Most of the wipe samples in armories were collected in undisturbed areas and therefore, results are worst case scenarios and do not correlate to these standards.
- b. OSHA has no specific requirement for work area surfaces. The lead standard (29 CFR 1910.1025(h)) states that all surfaces shall be maintained as free as practicable of accumulations of lead dust. In workplaces where lead dust is generated, surface levels may be much higher, but personnel exposures can be controlled by limiting airborne lead levels and following good cleanup and hygienic practices.
- c. OSHA used to cite a level of $200 \,\mu\text{g/ft}^2$ in their Technical Manual and $29 \,\text{CFR} \, 1926.62$ as guidance to its own inspectors for evaluating the cleanliness of lunchroom and locker room surfaces that are supposed to be kept as clean as possible.
- d. In a report titled Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that $200 \, \mu \text{g/ft}^2$ is a safe surface contamination level. They have also applied these standards as the decontamination levels for surfaces in administrative offices.

- e. It should be noted that levels above these recommendations do not necessarily mean there is a significant hazard to workers who are following good cleaning and hygienic practices since there is no correlation between wipe and air samples. Rather, we recommend these levels as a precautionary measure.
- 2. The NGB Occupational Health Branch is developing guidance for armories that are used as childcare facilities. All states will receive this guidance when it is completed. In the interim, we recommend the following actions:
- a. Clean all areas that will be accessible to children to the EPA dust-lead standard for children 6 years of age or under ($40 \mu g/ft^2$ on floors and $250 \mu g/ft^2$ on windowsills).
- b. Refer to the local authorities' regulations since they can be more stringent than federal regulations.
 - c. Post signs in the area to inform people of the presence of lead dust and its effects.
- d. If soldiers clean weapons in the facility change the policy so that they cannot clean their weapons in the facility, or if they are allowed to clean their weapons indoors, they must clean the area by wet wiping and mopping the area when they are done.
- e. If the paint is peeling, contact the state Environmental Office to test for lead content and provide recommendations.
- 3. Air samples collected in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m³ averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead dust in this building.

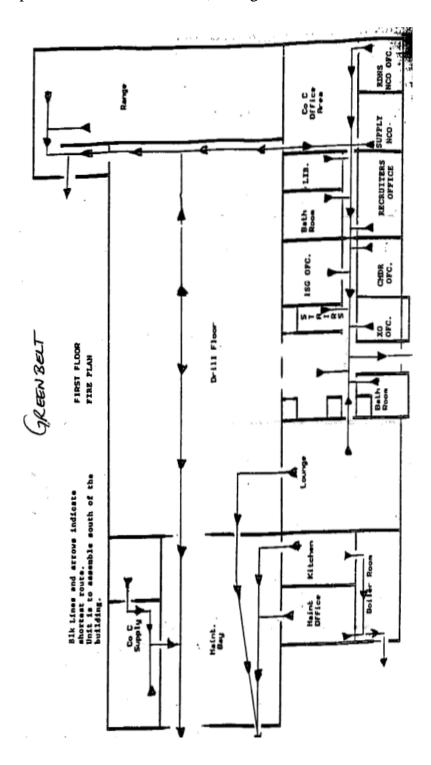
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APPENDIX D

FLOOR PLAN

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APPENDIX E

PHOTOGRAPHS

List of Photographs

Photograph	Location	Sample
No.		
1	Wall, hallway near Orderly Room and Recruiter's Office	
2	Wall, hallway near Orderly Room and Recruiter's Office	Bulk paint
3	Orderly Room, desktop	GBW01
4	Orderly Room, wall	GBW02
5	SGT Office, floor under window	GBW03
6	SGT Non-Responsive Office, window	Bulk paint
7	Recruiter's Office, top of cabinet	GBW04
8	Recruiter's Office, floor under window	GBW05
9	Kitchen, table top	GBW06
10	Kitchen, top of icemaker	GBW07
11	Former IFR, floor near bullet trap location	GBW08
12	Former IFR, mold on exercise equipment and chair	
13	Former IFR, floor near firing line	GBW09
14	Former IFR, window sill	GBW10
15	Former IFR, mold growth	
16	Second floor locker room, floor near window	GBW11
17	Second floor locker room, top of cabinet	GBW12
18	Supply Sergeant's Office, desktop	GBW13
19	Lobby, floor near front doors	GBW14
20	"Club" area, countertop	GBW15

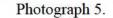






Photograph 3.





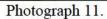


Photograph 6.



Photograph 7. Photograph 8. Photograph 9.

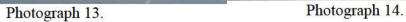






Photograph 12.







Photograph 15.





Photograph 17.



Photograph 18.



Photograph 19.

Photograph 20.

APPENDIX F

LEAD CLEANING GUIDANCE

HUD TECHNICAL GUIDELINES FOR THE EVALUATION AND CONTROL OF LEAD-BASED PAINT HAZARDS IN HOUSING 1998





CHAPTER 14: CLEANING

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Step-by-Step Summary



Cleaning: How To Do It

- Include step-by-step procedures for precleaning, cleaning during the job, and daily and final cleanings in project design or specifications.
- 2. Assign responsibilities to specific workers for cleaning and for maintaining cleaning equipment.
- 3. Have sufficient cleaning equipment and supplies before beginning work.
- 4. If contamination is extensive, conduct precleaning of the dwelling unit. Move or cover all furniture and other objects.
- Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust.
 Decontamination of all tools, equipment, and worker protection gear is required before it leaves containment areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
- 6. Schedule sufficient time (usually 30 minutes to an hour) for a complete daily cleaning, starting at the same time near the end of each workday after lead hazard control activity has ceased.
- For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
- Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
- Wash all surfaces with a lead-specific detergent, high-phosphate detergent, or other suitable cleaning agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every room is cleaned.
- 10. Repeat step 8. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed (see Chapter 11). Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not overexposed.
- 11. After final cleaning, perform a visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work. This visual examination should be performed by the owner or an owner's representative who is independent of the lead hazard control contractor.
- 12. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after the other construction work has been completed.
- 13. Paint or otherwise seal treated surfaces and interior floors.
- 14. Conduct a clearance examination (see Chapter 15).
- 15. If clearance is not achieved, repeat the final cleaning.



-Step-by-Step Summary (continued) -



- 16. Continue clearance testing and repeated cleaning until the dwelling achieves compliance with all clearance standards. As an incentive to conduct ongoing cleaning and a thorough final cleaning, the cost of repeated cleaning after failing to achieve clearance should be borne by the contractor as a matter of the job specification, not the owner.
- 17. Do not allow residents to enter the work area until cleaning is completed and clearance is established.
- 18. Cleaning equipment list:
 - ♦ HEPA vacuums.
 - Detergent.
 - ♦ Waterproof gloves.
 - Rags.
 - Sponges.
 - Mops.
 - Buckets.
 - ♦ HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs).
 - 6-mil plastic bags.
 - Debris containers.
 - Waste water containers.
 - Shovels.
 - Rakes.
 - Water-misting sprayers.
 - 6-mil polyethylene sheeting (or equivalent).





I. Introduction

This chapter describes cleaning procedures to be employed following abatement and interim control work. Dust removal as an interim control measure is covered in Chapter 11.

All lead hazard control activities can produce dangerous quantities of leaded dust. Unless this dust is properly removed, a dwelling unit will be more hazardous after the work is completed than it was originally. Once deposited, leaded dust is difficult to clean effectively. Whenever possible, ongoing and daily cleaning of leaded dust during lead hazard control projects is recommended. Ongoing and daily cleaning is also necessary to minimize worker exposures.

Cleaning is the process of removing visible debris and dust particles too small to be seen by the naked eye. Removal of lead-based paint hazards in a dwelling unit will not make the unit safe unless excessive levels of leaded dust are also removed. This is true regardless of whether the dust was present before or generated by the lead hazard control process itself. Improper cleaning can increase the cost of a project considerably because additional cleaning and clearance sampling will be necessary. However, cleaning and clearance can be achieved routinely if care and diligence are exercised.

A. Performance Standard

Although the cleaning methods described in this chapter are feasible and have been shown to be effective in meeting clearance standards, other methods may also be used if they are safe and effective. This performance-oriented approach should stimulate innovation, reduce cost, and ensure safe conditions for both residents and workers.

B. Small Dust Particles

Dust particles that are invisible to the naked eye remain on surfaces after ordinary cleaning procedures. A visibly clean surface may contain high and unacceptable levels of dust particles and require special cleaning procedures.

C. Difficulties in Cleaning

While cleaning is an integral and essential component of any lead hazard control activity, it is also the most likely part of the activity to fail.

Several common reasons for this failure include low clearance standards, worker inexperience, high dust-producing methods, and deadlines.

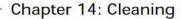
1. Low Clearance Standards

Because very small particles of leaded dust are easily absorbed by the body when ingested or inhaled, a small amount can create a health hazard for young children. Therefore, "clearance standards" are extremely low for acceptable levels of leaded dust particles on surfaces after hazard control activities, and careful cleaning procedures are required. Although it is not possible to remove all leaded dust from a dwelling, it is possible to reduce it to a safe level.

Clearance standards are described more fully in Chapter 15. The permissible amount of leaded dust remaining on each of the following surfaces following lead hazard work is as follows:

- 100 μg/ft² on floors.
- 500 µg/ft² on interior window sills (stools).
- 800 µg/ft² on window troughs (the area where the sash sits when closed).
- 800 μg/ft² on exterior concrete.

These levels are based on wipe sampling.
Clearance testing determines whether the premises or area are clean enough to be reoccupied after the completion of a lead paint hazard control project. A cleaned area may not be reoccupied until compliance with clearance standards has been established. To prevent delays, final testing and final cleaning activities should be coordinated.







2. Worker Inexperience

To understand the level of cleanliness required to meet the established clearance standards for hazard control cleanup, new hazard control personnel often require a significant reorientation to cleaning. Many construction workers are used to cleaning up only dust that they can see, not the invisible dust particles that are also important to remove.

3. High Dust-Producing Methods and/or Inadequate Containment

High dust-generating methods, inadequate containment during hazard control work, and poor work practices can all make achievement of clearance particularly difficult. Work practices necessary to prevent spreading of dust throughout a dwelling (e.g., by tracking dust out of work areas) are essential but sometimes tedious. Essential work practices are sometimes mistakenly considered to be "flexible guidelines" rather than necessary standards that are designed to ensure that the job is completed, not only safely, but also on time and within budget.

4. Deadlines

Daily and final cleanings have sometimes been compromised due to project deadlines, since cleaning comes at the end of the job. Hurried efforts often result in clearance failure. Delayed and over-budget hazard control projects are often the result of repeated, unplanned recleanings that are necessitated by inadequate containment and sloppy work practices.

II. Coordination of Cleaning Activities

A. Checklist

The owner or contractor may use the following cleaning checklist before any lead hazard control activity:

- ✓ Is the critical importance of cleaning in a hazard control project understood?
- ✓ Have all workers been trained and certified for hazard control work?

- ✓ Have the precleaning, daily, and final cleanings been scheduled properly and coordinated with the other participants in the hazard control process?
- ✓ Have cleaning equipment and materials been obtained?
- ✓ Do the workers know how to operate and maintain special cleaning equipment, and do they have directions for the proper use of all cleaning materials?
- ✓ Have all workers carefully studied the step-by-step procedures for precleaning (if needed), in-progress cleaning, and daily and final cleanings?
- ✓ Are all workers properly protected during the cleaning processes (see Chapter9)?
- ✓ Have provisions been made to properly contain and store potentially hazardous debris (see Chapter 10)?
- √ Have dust-clearance testing and related visual inspections been arranged (see Chapter 15)?
- ✓ Are the clearance criteria to be met fully understood?
- ✓ Have all appropriate surfaces been properly painted or otherwise sealed?
- ✓ Have appropriate records been maintained that document participants' roles in the hazard control project?

B. Equipment Needed for Cleaning

The following equipment is needed to conduct cleaning: high-efficiency particulate air (HEPA) vacuums and attachments (crevice tools, beater bar for cleaning rugs), detergent, waterproof gloves, rags, sponges, mops, buckets, 6-mil plastic bags, debris containers, waste water containers, shovels, rakes, water-misting sprayers, and 6-mil polyethylene plastic sheeting (or equivalent).



C. Waste Disposal

Regulations governing hazardous and nonhazardous waste storage, transportation, and disposal affect both the daily and final cleaning procedures. The hazard control contractor and the disposal contractor should work together to establish formal written procedures, specifying selected containers, storage areas, and debris pickups, to ensure that all relevant regulations are met.

III. Cleaning Methods and Procedures

Many of the special cleaning methods and procedures detailed in this chapter are not standard operating procedure for general home improvement contractors. Therefore, project designers, responsible agencies, or owners must ensure that contractors follow the methods and procedures recommended herein or specially designed alternative procedures, even though some may appear to be redundant and unnecessary. These methods have been shown to be feasible and effective in many situations and skipping steps in the cleaning procedures can be counterproductive.

A. Containment

Because of the difficulty involved in the removal of fine dust, dust generated by hazard control work should be contained to the extent possible to the inside of work areas. Inadequately constructed or maintained containment or poor work practices will result in additional cleaning efforts, due to dust that has leaked out or been tracked out of the work area (see Chapter 8).

B. Basic Cleaning Methods: Wet Wash and Vacuum Cleaning Techniques

Because leaded dust adheres tenaciously, especially to such rough or porous materials as weathered or worn wood surfaces and masonry surfaces (particularly concrete), workers should be trained in cleaning methods. As a motivator,

some contractors have awarded bonuses to workers who pass clearance the first time.

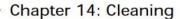
Two basic cleaning methods have proven effective, when used concurrently, in lead-based paint hazard control projects: a special vacuum cleaner equipped with a HEPA exhaust filter, followed by wet washing with special cleaning agents and rinsing, followed by a final pass with the HEPA vacuum.

Although HEPA filtered vacuums and triso-dium phosphate (TSP) cleaners have been considered the standard cleaning tools for lead hazard control projects, new research, discussed under the "Alternatives Methods" section in this chapter, suggests that other tools and products may also be effective in efficiently cleaning dust while providing adequate worker protection from airborne exposure risks. Some of these innovations may even be superior.

1. HEPA Vacuuming

HEPA vacuums differ from conventional vacuums in that they contain high-efficiency filters that are capable of trapping extremely small, micron-sized particles. These filters can remove particles of 0.3 microns or greater from air at 99.97 percent efficiency or greater. (A micron is 1 millionth of a meter, or about 0.00004 inches.) Some vacuums are equipped with an ultra-low penetration air (ULPA) filter that is capable of filtering out particles of 0.13 microns or greater at 99.9995 percent efficiency. However, these ULPA filters are slightly more expensive, and may be less available than HEPA filters.

Vacuuming with conventional vacuum machines is unlikely to be effective, because much of the fine dust will be exhausted back into the environment where it can settle on surfaces. A recent Canadian study revealed that finedust air levels were exceedingly high when a standard portable vacuum with a new bag was used, although partially filled bags were found to be more efficient (CMHC, 1992). Considerations for the proper use of a HEPA vacuum are listed below.







Operating Instructions

There are a numerous manufacturers of HEPA vacuums. Although all HEPA vacuums operate on the same general principle, they may vary considerably with respect to specific procedures, such as how to change the filters. To ensure the proper use of equipment, the manufacturer's operating instructions should be carefully followed and if possible, training sessions arranged with the manufacturer's representative.

Although HEPA vacuums have the same "suction" capacity as ordinary vacuums that are comparably sized, their filters are more efficient. Improper cleaning or changing of HEPA filters may reduce the vacuum's suction capability.

Special Attachments

Because the HEPA vacuum will be used to vacuum surfaces other than floors, operators should buy attachments and appropriate tool kits for use on different surfaces—such as brushes of various sizes, crevice tools, and angular tools.

Selecting Appropriate Size(s)

HEPA vacuums are available in numerous sizes, ranging from a small lunchbucket-sized unit to track-mounted systems. Two criteria for size selection are the size of the job and the type of electrical power available. Manufacturer recommendations should be followed.

Wet-Dry HEPA Vacuums

Some hazard control contractors have found the wet-dry HEPA vacuums to be particularly effective in meeting clearance standards. These vacuums are equipped with a special shut-off float switch to protect the electrical motor from water contact.

Prefilters

HEPA filters are usually used in conjunction with a prefilter or series of prefilters that trap the bulk of the dust in the exhaust airstream, particularly the larger particles. The HEPA filter traps most of the remaining small particles that have passed through the prefilter(s). All filters must be maintained and replaced or

cleaned as specified in the manufacturer's instructions. Failure to do so may cause a reduction in suction power (thus reducing the vacuum's efficiency and effectiveness). Failure to change prefilters may damage the vacuum motor and will also shorten the service life of the HEPA filter, which is far more expensive than the prefilters.

HEPA Vacuuming Procedures

Surfaces frequently vacuumed include ceilings, walls, floors, windows, interior and exterior sills, doors, heating, ventilation, and air conditioning (HVAC) equipment (heating diffusers, radiators, pipes, vents), fixtures of any kind (light, bathroom, kitchen), built-in cabinets, and appliances.

To aid in dislodging and collecting deep dust and lead from carpets, the HEPA vacuum must be equipped with a beater bar (agitator head) that is fixed to the cleaning head. This bar should be used on all passes on the carpet face during dry vacuuming (see Chapter 11 for details on carpet and furniture cleaning).

All rooms and surfaces should be included in the HEPA vacuum process, except for those that (1) were found not to have lead-paint hazards and were properly separated from work areas before the process began (see Chapter 8), or (2) were never entered during the process. Porches, sidewalks, driveways, and other exterior surfaces should be vacuumed if exterior hazard control work was conducted, or if debris was stored or dropped outside. Vacuuming should begin on the ceilings and end on the floors, sequenced to avoid passing through rooms already cleaned, with the dwellings' entryway cleaned last.

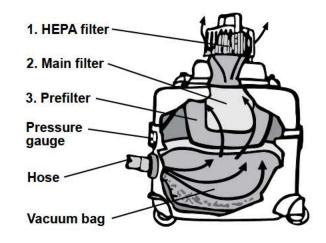
Emptying the HEPA Vacuum

Used filters and vacuumed debris are potentially hazardous waste and should be treated accordingly (see Chapter10). Therefore, operators should use extreme caution when opening the HEPA vacuum for filter replacement or debris removal to avoid accidental release of accumulated dust into the environment. This may occur, for example, if the vacuum's seal has been broken and the vacuum's bag is disturbed.





Figure 14.1a Vacuum With a HEPA Filter.



Parts of a HEPA-vacuum

Most HEPA-vacuums have three filters: HEPA filter, main filter, and prefilter. Debris gets sucked in through the hose into the vacuum bag. The air and dust get filtered through the prefilter, the main filter, and the HEPA filter. The HEPA filter captures the lead dust before the air is released into the work area again.

Operators should also wear a full set of protective clothing and equipment, including appropriate respirators, when performing this maintenance function, which should be done in the containment area or offsite.

2. Wet Detergent Wash

Several types of detergents have been used to remove leaded dust. Those with a highphosphate content (containing at least 5 percent trisodium phosphate, also known as TSP) have been found to be effective when used as part of the final cleaning process (Milar, 1982). TSP detergents are thought to work by coating the surface of dusts with phosphate or polyphosphate groups which reduces electrostatic interactions with other surfaces and thereby permits easier removal. Because of environmental concerns some States have restricted the use of TSP, and some manufacturers have eliminated phosphates from their household detergents. However, high-TSP detergents can usually be found in hardware stores and may be permitted for limited use, such as lead hazard control.

Other non-TSP cleaning agents developed specifically for removing leaded dust have also been found to be effective (possibly more effective than TSP) in limited trials by several



Pressure gauge

Figure 14.1b Pressure Gauge Indicator Shows When Filters Require Changing.





Figure 14.2 HEPA Vacuum Sizes and Tools.

investigators (Grawe, 1993; Wilson, 1993) and may also be safer, since TSP is a skin and eye irritant. See section VII for more information on non-TSP detergents. Proper procedures for using high-phosphate detergents also apply to most other types of detergents and include the following steps:

Manufacturer's Dilution Instructions

Users of cleaning agents for leaded dust removal should follow manufacturer's instructions for the proper use of a product, especially the recommended dilution ratio. Even diluted, trisodium phosphate is a skin irritant and users should wear waterproof gloves. Eye protection should also be worn, and portable eyewash facilities should be located in or very near the work area. Consult manufacturer's directions for the use of other detergents.

Appropriate Cleaning Equipment

Because a detergent may be used to clean leaded dust from a variety of surfaces, several types of application equipment are needed, including cleaning solution spray bottles, wringer buckets, mops, variously sized hand sponges, brushes, and rags. Using the proper equipment on each surface is essential to the quality of the wetwash process.

Proper Wet-Cleaning Procedures

At the conclusion of the active lead hazard control process and the initial HEPA vacuuming, all vacuumed surfaces should be thoroughly and completely washed with a high-phosphate solution or other lead-specific cleaning agent (or equivalent) and rinsed. Select a detergent that does not damage existing surface finishes (TSP may damage some finishes). Work should proceed from ceilings to floors and sequenced to avoid passing through rooms already cleaned.

Changing Cleaning Mixture

Many manufacturers of cleaners will indicate the surface area that their cleaning mixture will cover. To avoid recontaminating an area by cleaning it with dirty water, users should follow manufacturer-specified surface-area limits. However, regardless of manufacturers' recommendations, the cleaning mixture should be changed after its use for each room. As a rule of thumb, 5 gallons should be used to clean no



Figure 14.3 Goggles, Face Shields, Gloves, and Eye Wash Facilities Should Be Available When Used With Chemicals Such as TSP. EMERGENCY EYE WASH STATION

more than 1,000 square feet. Used cleaning mixture is potentially hazardous waste (see Chapter 10); consult with your local water and sewage utility for directions on its proper disposal. Wash water should never be poured onto the ground. The wash water is usually filtered and then poured down a toilet (if the local water authority approves).

Latex

3. The HEPA/Wet Wash/HEPA Cycle

Typical Procedures

Neoprene

The usual cleaning cycle that follows lead hazard control activities is called the HEPA vacuum/wet wash/HEPA cycle and is applied to an entire affected area as follows:

First, the area is HEPA vacuumed.

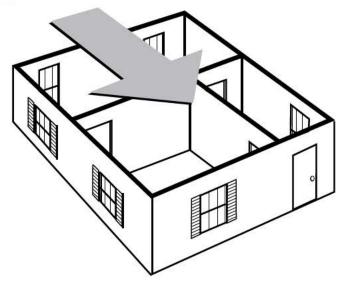
Nitrile



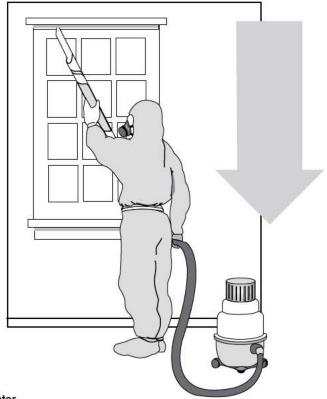


Figure 14.4a The HEPA Vacuum, Wet Wash, HEPA Vacuum Cycle Helps in Meeting Clearance Standards.

HEPA vacuum all surfaces Start at the end farthest from the main entrance/exit. As you vacuum, move towards the main exit and finish there.



Begin at the top of each room and work down. For example, start with the top shelves, the top of the woodwork, and so on, and work down to the floor. Do every inch of the windows, especially the window troughs.



Courtesy: Alice Hamilton Occupational Health Center





- Next, the area is washed down.
- After drying, the area is again HEPA vacuumed.

The rationale for this three-pass system is as follows:

- The first HEPA vacuum removes as much dust and remaining debris as possible.
- The wet wash further dislodges dust from surfaces.
- The final HEPA cycle removes any remaining particles dislodged but not removed by the wet wash.

Single-Pass Wet Wash/HEPA Vacuum

Some lead hazard control contractors have found HEPA spray cleaner vacuums to be a cost-effective alternative to the three-pass system. Similar to home carpet-cleaning machines, these vacuums simultaneously deliver a solution to the surface and recover the dirty solution. Theoretically, this process combines two of the steps in the HEPA vacuum/wet wash/HEPA cycle into one step. While anecdotal evidence indicates that the spray cleaner wet wash/HEPA is effective for some uses, limitations have been noted in its use for ceilings, vertical surfaces, and hard to reach areas. This device may be used as long as clearance standards are met.

Figure 14.4b (continued)

Use special attachments

Use the rubber cone where the floor meets the baseboard and along all the cracks in the floor boards. Use the brush tool for walls and woodwork.

Use the wheeled floor nozzle for bare floors and the carpet beater for rugs.

Move slowly

Vacuum slowly so the HEPA vacuum can pick up all the lead dust.



Rubber Cone

Dust Brush



Powered Carpet Beater



Wheeled Floor Nozzle





Figure 14.4c (continued)

Wash all surfaces with suitable detergents

Wash all surfaces in the work area with suitable detergents, including areas that had been covered with plastic. Some wallpaper should only be HEPA vacuumed, since it may be damaged by the detergent.



Wipe All Surfaces



Wet Mop Floor



Don't Dry Sweep





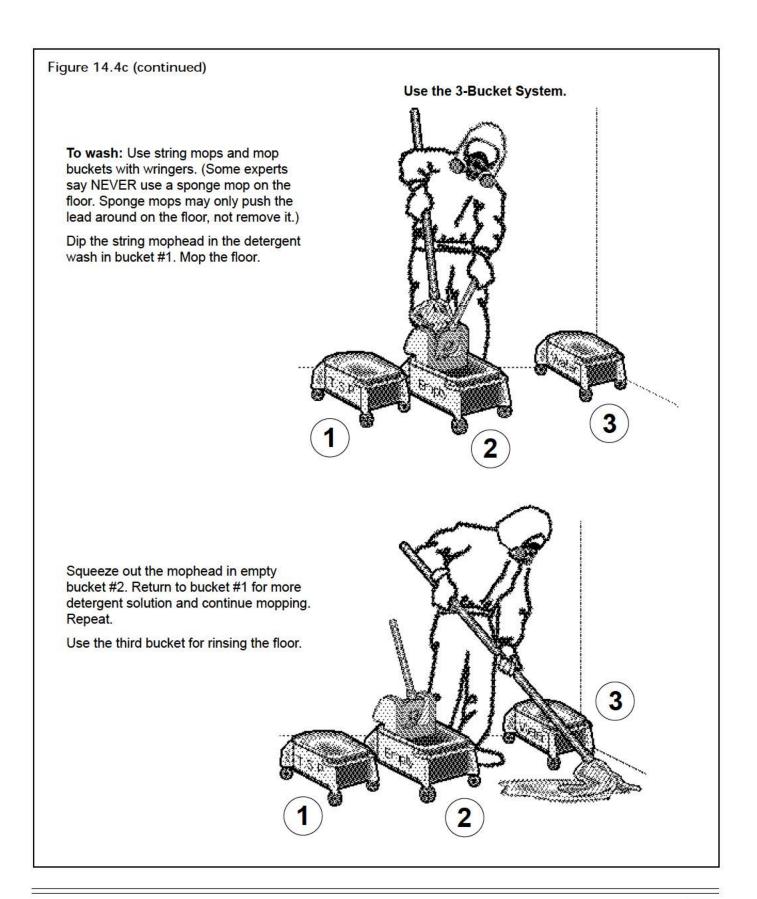


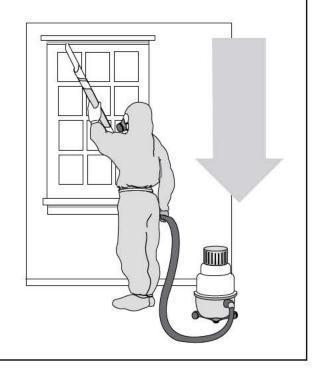




Figure 14.4d (continued)

HEPA vacuum all surfaces a final time HEPA vacuum *all surfaces* in the work area, including areas that had been covered with plastic.

Starting at the far end, work towards the decontamination area. Begin with ceilings or the top of the walls and work down, cleaning the floors last. Do every inch of the windows, especially the troughs. Use the corner tool to clean where the floor meets the baseboard and all the cracks in the floor boards. Use the brush tool for the walls. Move slowly and carefully to get all the dust.



4. Sealing Floors

Before clearance, all floors without an intact, nonporous coating should be coated. Sealed surfaces are easier for residents to clean and maintain over time than those that are not sealed. Wooden floors should be sealed with a clear polyurethane or painted with deck enamel or durable paint. Vinyl tile, linoleum, and other similar floors should be sealed with an appropriate wax. Concrete floors should be sealed with a concrete sealer or other type of concrete deck enamel. However, if these floors are already covered by an effective coat of sealant, it may be possible to skip this step.

As an alternative to sealing, floors may be covered with new vinyl tile, sheet vinyl, linoleum flooring, or the equivalent to create a more permanent cleanable surface. New surfaces should be cleaned with a cleaning solution that is appropriate for that type of surface.

IV. Order of Cleaning Procedures During Lead Hazard Control

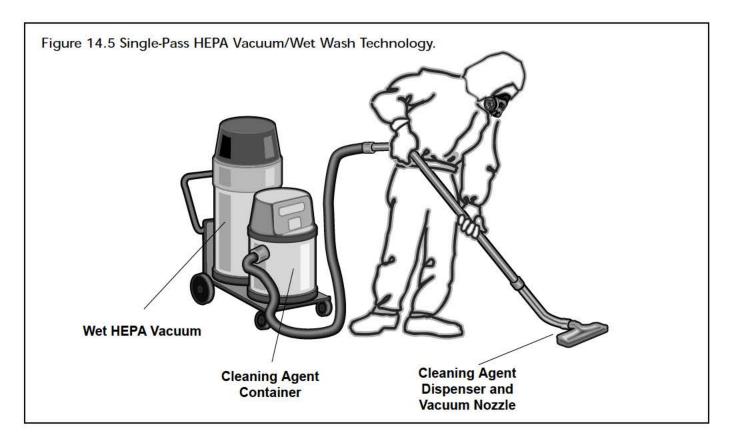
The special cleaning procedures to be followed during a lead-based paint hazard control project are discussed in chronological order below. Skipping steps in the process may result in failure to meet post-lead hazard control clearance standards.

A. Precleaning Procedures

Precleaning (i.e., cleaning conducted before lead hazard control is begun) is necessary only in dwelling units that are heavily contaminated with paint chips. Precleaning involves the removal of large debris and paint chips, followed by HEPA vacuuming. These steps may be followed by removal of occupant personal possessions, furniture, or carpeting, depending on the





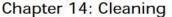


Worksite Preparation Level selected (see Chapter 8). If the furniture will not be cleaned, it should be removed from the area or covered with plastic prior to beginning the precleaning procedure. Carpeting should always be misted before its removal to control the generation of hazardous dust.

It is usually the resident's responsibility to remove most of his or her personal possessions. However, if necessary, owners or project management should be prepared to complete this activity before lead hazard control work begins. As a last resort, the contractor may pack any remaining belongings and carefully seal and move the boxes, supplying all necessary boxes, packing materials, and staff to complete the task. Following cleaning and clearance, the contractor should return all packed items to their appropriate places. Leaving these tasks to the contractor may be expensive and inefficient, since the contractor will need to be insured for this function if the occupant's



Figure 14.6 Precleaning Is Needed in Areas Where Contamination and Deterioration Are High.







belongings are damaged. Additionally, moving furniture, rugs, drapes, and other items owned by the occupant could increase leaded dust levels. Clearance should be conducted after cleaning but before resident items are moved back in.

B. Ongoing Cleaning During the Job

Periodic HEPA vacuuming during the lead hazard control work may be necessary to minimize tracking of dust and paint chips from one area to another (e.g., when a large amount of paint chips or dust is being generated).

C. Daily Cleaning Procedures

Cleaning activity should be scheduled at the end of each workday when all active lead hazard control throughout the dwelling has ceased. Sufficient time must be allowed for a thorough and complete cleaning (usually about 30 minutes to an hour). Daily cleaning helps achieve clearance dust levels by minimizing problems that may otherwise occur during final cleaning and limiting worker exposures. While daily cleaning can be skipped in vacant dwelling units, it is required when occupants will



Figure 14.7 Plastic Sheeting Should Be Repaired as Part of Daily Cleanup.

return in the evening. Under no circumstances should debris or plastic be left outside overnight in an unsecured area, even if the dwelling is vacant. Daily cleaning should consist of:

- Removing large debris.
- Removing small debris.
- HEPA vacuuming, wet clean, HEPA vacuuming (horizontal surfaces only).
- Cleaning exterior.
- Patching and repairing plastic sheeting.
- ♦ Securing debris/plastic.

1. Large Debris

Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to a secure area on the property designated for waste storage. All sharp corners, edges, and nails should be hammered down to prevent injury and minimize the tearing of plastic. It is not necessary to wrap each individual piece of debris in plastic if the entire load can be wrapped. A secure area either outside or inside the property must be designated as a temporary waste-storage area. Covered, secured, and labeled dumpsters placed on or near the property may be used. Proper segregation of waste should be enforced at this time (see Chapter 10).

2. Small Debris

After being misted with water, small debris should be swept up, collected, and disposed of properly. The swept debris should be placed in double 4-mil or single 6-mil polyethylene (or equivalent) plastic bags, properly sealed, and moved to the designated trash storage area. Trash bags should not be overloaded; overloaded bags may rupture or puncture during handling and transport.

3. Exterior Cleaning

Areas potentially affected by exterior lead hazard control should be protected via a containment system (see Chapter 8). Because weather can adversely affect the efficacy of exterior





containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleaning, the immediate area should be examined visually to ensure that no debris has escaped containment. Any such debris should be raked or vacuumed and placed in single 6-mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris. HEPA vacuuming is appropriate for hard exterior surfaces, not soil.

4. Worker Protection Measures

General worker protection measures are discussed in Chapter 9. Studies indicate that during daily cleaning activities, especially while wet sweeping, workers may be exposed to high levels of airborne dust. Therefore, workers should wear protective clothing and equipment, especially appropriate respirators.

5. Maintaining Containment

The integrity of the plastic sheeting used in a lead hazard control project must be maintained. During their daily cleaning activities, workers should monitor the sheeting and immediately repair any holes or rips with 6-mil plastic and duct tape.

V. Order of Final Cleaning Procedures After Lead Hazard Control

Before treated surfaces can be painted or sealed, final cleaning procedures must be completed. Because airborne dust requires time to settle, the final cleaning process should start no sooner than 1 hour after active lead hazard control has ceased in the room. See Appendix 11 for details regarding dust settling.

A. Final Cleaning

As the first stage in the final cleaning, floor plastic should be misted and swept as detailed earlier in this chapter. Upper-level plastic, such as that on cabinets and counters, should be removed first, after it has been misted with water and cleaned. All plastic should be folded

carefully from the corners/ends to the middle to trap any remaining dust. Next, remove both layers of plastic from the floor.

Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after the cleaning and removal of other plastic sheeting; these sheets may then be misted, cleaned, and removed last.

Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plastic-removal process usually requires workers to use protective clothing and respirators.

After the plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle, starting with the ceiling and working down to the floor. After surfaces are repainted or sealed, a final HEPA/wet wash/HEPA cycle may be necessary if accumulated dust caused by other work is visible.

1. Decontamination of Workers, Supplies, and Equipment

Decontamination is necessary to ensure that worker's families, other workers, and subsequent properties do not become contaminated. Specific procedures for proper decontamination of equipment, tools, and materials prior to their removal from lead hazard control containment areas should be implemented, as described below and in Chapters 9 and 10.

Work clothing, work shoes, and tools should not be placed in a worker's automobile unless they have been laundered or placed in sealed bags. All vacuums and tools that were used should be wiped down using sponges or rags with detergent solutions.

Consumable/disposable supplies, such as mop heads, sponges, and rags, should be replaced, after each dwelling is completed. Soiled items should be treated as contaminated debris (see Chapter 10).







Figure 14.8a Pick Up Corners of Plastic Sheeting.



Figure 14.8b Fold Plastic Inward.

Durable equipment, such as power and hand tools, generators, and vehicles, should be cleaned prior to their removal from the site; the cleaning should consist of a thorough HEPA vacuuming followed by washing.

B. Preliminary Visual Examination

After the preliminary final cleaning effort is completed, the certified supervisor should visually evaluate the entire work area to ensure that all work has been completed and all visible dust and debris have been removed. While the preliminary examination may be performed by the lead hazard control supervisor, contractor, or owner as a preparatory step before the final clearance examination, it does not replace the independent visual assessment conducted during clearance.

If the visual examination results are unsatisfactory, affected surfaces must be retreated and/or recleaned. Therefore, it is more cost effective to have the supervisor rather than the clearance examiner perform this initial examination.

C. Surface Painting or Sealing of Nonfloor Surfaces

The next step of the cleaning process is painting or otherwise sealing all treated surfaces except floors.

Surfaces, including walls, ceilings, and woodwork, should be coated with an appropriate primer and repainted. Surfaces enclosed with vinyl, aluminum coil stock, and other materials traditionally not repainted are exempt from the painting provision.

D. Final Inspection

The final clearance evaluation should take place at least 1 hour after the final cleaning. Clearance has three purposes: 1) to ensure that the lead hazard control work is complete, 2) to detect the presence of leaded dust, and 3) to make sure that all treated surfaces have been repainted or otherwise sealed. Clearance is usually performed after the sealant is applied to the floor. See Chapter 15 for information on clearance examination procedures.

E. Recleaning After Clearance Failure

If after passing the final visual examination, the dwelling unit fails the clearance wipe dust tests,





the HEPA/wet wash/HEPA cleaning cycle should be carefully and methodically repeated. Failure is an indication that the cleaning has not been successful. Recleaning should be conducted under the direct supervision of a certified supervisor. Care should be exercised during the recleaning of "failed" surfaces or components to avoid recontaminating "cleared" surfaces or components.

VI. Cleaning Cost Considerations

An important consideration in determining lead hazard control strategies and methods is the cost and difficulty of required daily and final cleanup operations and the ease with which one can meet dust-clearance standards. A general rule of thumb is that lead hazard control strategies that generate the most dust will have higher cleanup costs and higher initial clearance test-failure rates.

A. Initial Clearance Test Failure Rates

The likelihood of passing final dust-clearance tests is highly correlated with the chosen intervention strategy, methods, and care exercised by the contractor. For example, in one study (HUD, 1991) initial wipe-test failure rates were 14 percent for interior window sills, 19 percent for floors, and 33 percent for window troughs. The pass/fail rates for each surface were strongly associated with the dwelling unit abatement strategy employed. Chemical removal and hand-scraping strategies experi-enced higher failure rates than replacement and encapsulation/enclosure strategies (see Table 14.1).

However, results of the HUD demonstration project indicated that clearance failure is not solely related to abatement method. The report stated that "the diligence and effectiveness of an abatement contractor's cleaning process ... had a major impact on ... the likelihood of the dwelling unit to pass the final wipe test clearance" (HUD, 1991).



Figure 14.8c Dispose of Plastic Sheeting in a Plastic Trash Bag.

B. Key Factors In Effective Cleaning

Effective cleaning will be aided by adequate sealing of surfaces with polyethylene sheeting prior to lead hazard control, proper daily cleaning practices, good worker training, and attention to detail. Where poor worksite preparation is employed, additional cleaning may be required to meet clearance.

C. Special Problems

Surfaces such as porous concrete, old porous hardwood floors, and areas such as corners of rooms and window troughs pose especially difficult cleaning challenges. Porous concrete and corners of rooms normally require additional vacuuming to achieve an acceptable level of cleanliness.

The lead hazard control strategy of enclosure is frequently chosen for window troughs and for old porous hardwood floors due to the difficulty of adequately cleaning these surfaces. This





option provides not only a clean surface but a more permanently cleanable surface for dwelling occupants to maintain.

VII. Alternative Methods

Alternatives to the recommended cleaning tools and practices discussed in this chapter are available, some having significant potential for increasing effectiveness and lowering costs.

A recent Canadian study (CMHC, 1992) evaluated the effectiveness of contaminated dust cleanup activities using tools that would generally be available to construction contractors and homeowners. Vinyl flooring and carpeting were cleaned using several wet/dry vacuuming systems, sweeping, and wet mopping. The study found that regular vacuums with empty bags send a steady stream of fine particles into the air, while vacuums with partially filled bags were more efficient. This finding suggests the necessity for HEPA vacuums. Other vacuums may be used if workers do not experience increased exposures, if compliance with clearance standards is achieved, and if a variance from OSHA regulation (29 CFR 1926.62 (h)(4)) is obtained by the contractor or employer (if required).

Agitator heads on vacuums were demonstrated to significantly enhance vacuum effectiveness on carpets in cleaning up fine dust without

increasing airborne dust levels. Table 14.2 suggests that a central vacuum with an agitator head is most efficient at removing dust and minimizing recontamination, probably because the vacuum exhaust is blown away from living areas. Because many houses do not have central vacuuming systems, a portable HEPA vacuum is the next best choice (see Table 14.2). Vacuums without agitator heads appeared to perform relatively poorly on carpets.

A. Vacuums

Regular (non-HEPA) dry vacuums potentially produce hazardous levels of airborne dust and therefore should be avoided. Externally exhausted vacuum units with adequate dustretaining capability may be used. The OSHA lead standard requires the use of HEPA vacuum equipment (see 29 CFR 1926.62 (h)(4), which states, "where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters").

B. Trisodium Phosphate and Other Detergents

TSP detergents have been used successfully for a number of years in lead hazard control work. However, in recent years, other new cleaning agents have been developed specifically for leaded dust removal. The need for alternatives has been fueled by the fact that TSP is an eye

Table 14.1 Initial Cleaning Wipe-Test Failure Rates for Various Abatement Strategies

Dust Test Location	Hand Scrape w/Heat Gun	Chemical Removal	Enclosure	Encapsulation	Replacement	All Methods
Floors	28.8%	22.7%	20.0%	13.8%	12.5%	19%
Sills	24.4%	24.1%	8.2%	4.8%	17.4%	14%
Wells	44.5%	45.7%	23.7%	25.7%	21.0%	33%

Source: U.S. Department of Housing and Urban Development (August 1991) The HUD Lead-Based Paint Abatement Demonstration (FHA)





and skin irritant and is increasingly restricted from household use and unavailable in many local jurisdictions. TSP also damages some finishes. Recently reported trials of two new products suggest that alternative lead-specific cleaning agents may be more effective and safer than TSP (Grawe, 1993; Wilson, 1993).

These Guidelines do not prohibit the use of non-TSP cleaning agents. HUD encourages further evaluation of alternative cleaning methods. Use of any cleaning agent that results in compliance with clearance criteria is encouraged.

Table 14.2 Mass Removal Efficiency for Extended Vacuuming Cycles

	Mass Removal Efficiency Percentages						
Cycle Number	Cleaning Method						
	Central Vacuum—Plain Tool	Central Vacuum—Agitator Head	HEPA Vacuum	Portable Vacuum—Plain Tool			
1	34.7	71.0	55.4	17.5			
2	47.0	80.2	61.2	23.0			
3	51.9	85.9	66.3	26.6			
4	56.0	87.8	67.0	29.4			
5	59.3	88.9	72.1	32.5			
6	61.6	91.2	74.4	34.9			
7	63.8	93.1	76.4	36.5			
8	67.5	95.4	77.5	38.1			
9	67.5	97.7	78.7	40.1			
10	67.2	100.0	80.2	41.7			
11		102.3	80.2	41.7			
12		104.6	84.1	44.8			
13		104.6	84.5	46.8			
14		103.8	84.5	48.4			
15				49.6			
16				50.8			
17				52.4			
18				53.6			
19				54.4			
20				55.2			

Source: Canada Mortgage and Housing Corporation: Saskatchewan Research Council (December 1992) Effectiveness of Clean-up Techniques for Leaded Paint Dust

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MDARNG Facilities IH Baseline Surveys, MG (Brevet) John R. Kenly Armory, Greenbelt, MD, Report No. 55-ML-01ED-03/07, 13 August 2003

APPENDIX G

MOLD CLEANING GUIDANCE

Army Facilities Management Information Document on Mold Remediation Issues

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

Moisture Control: The Army Way to Mold Prevention!

INTRODUCTION

Concern about indoor exposure to mold has been increasing as the public becomes more aware that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions.

This document provides the best and most current guidance for remediation of clean water damage (<48 hours) and mold contamination (>48 hours) into one resourceful Army guide. This guide has been designed to provide information to facilities management individuals who have little or no experience with mold remediation. It will assist them in making a reasonable judgment as to whether the situation can be handled in-house. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor. If an outside contractor is employed, they must have experience cleaning up mold. Check their references, and have them follow the recommendations presented in this document, EPA guidelines, and/or guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH). A multi-disciplinary team approach to mold concerns is best. A health and safety professional, such as an industrial hygienist, should be consulted prior to any remediation activities to assist in the project.

Molds produce tiny spores to reproduce. Mold spores float through the indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.(1)

In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur. Any initial water infiltration should be stopped and clean up began immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. (Refer to Appendix A for detailed guidance on clean water damage response). If the source of water is elevated humidity, actions to maintain the relative humidity levels below 60% to inhibit mold growth should be taken (2). Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

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MOLD PREVENTION TIPS:

[Adapted from EPA, reference 1]

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing
 the moisture level in air (humidity). To increase surface temperature, insulate or
 increase air circulation. To reduce the moisture level in air, repair leaks, increase
 ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and
 humid).
- Keep heating, ventilating, and air-conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

REMEDIATION PLANNING

- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Select cleanup methods for moldy items (Appendix B)
- Select Personal Protection Equipment (PPE)- protect remediators (Appendix B)
- Select containment equipment protect building occupants (Appendix B)
- Select remediation personnel who have the experience and training needed to implement the remediation plan and use PPE and containment as appropriate

REMEDIATE MOISTURE AND MOLD PROBLEMS

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Clean and dry moldy materials (Appendix B)
- Discard moldy porous items that can't be cleaned (Appendix B)

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REMEDIATION PROCEDURES

Four levels of abatement are described below. The size of the area impacted by mold contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of mold and preventing dust contaminated with mold from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. (3)

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work. (1 and 3)

The use of bleach or other biocides is questionable in most cases (8). The effectiveness of bleach in reducing living mold is dependent on concentration, residual chlorine levels, and contact time on the surface (8). All of these factors are difficult to control during remediation. Removal of all mold growth can generally be accomplished by physical removal of materials supporting active growth and thorough cleaning of non-porous materials (4). Therefore, application of a biocide serves no purpose that could not be accomplished with a detergent or cleaning agent (4).

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."(4)

FOUR REMEDIATION LEVELS

[Adapted from NYCDOH Guidelines on Assessment and Remediation of Fungi in Indoor Environments (3) and EPA (1)]

Level I: Small Isolated Areas – Total surface area affected less than 10 square feet - e.g., ceiling tiles, small areas on walls. Refer to Appendix B for detailed guidance.

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Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Level II: Medium – Total Surface Area affected between 10 and 100 square feet - e.g., several wallboard panels. (See Appendix B for detailed guidance).

The following procedures at a minimum are recommended:

Refer to Appendix C for proper PPE selection. Limited or Full protection may be required depending on the situation.

Refer to Appendix D for Containment procedures.

The work area and areas directly adjacent should be covered with a single layer of 6 mil fire-retardant polyethylene sheet(s) and taped before remediation, to contain dust/debris.

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(29 CFR 1910.1200).

Seal ventilation ducts/grills in the work area and areas directly adjacent with 6 mil polyethylene sheeting. Use an exhaust fan with a High Efficiency Particulate Air (HEPA) filter to generate negative pressurization.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and surrounding areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level III be followed.

Level III: Large Area – Total Surface Area affected greater than 100 square feet or potential for increased occupant or remediator exposure during remediation is estimated to be significant. (See Appendix B for detailed guidance).

The following procedures are recommended:

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from occupied spaces using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

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The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air(4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If any remediation sampling is deemed necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

Level IV: Remediation of HVAC Systems (See Appendix B for detailed guidance. For a small area (<10 ft²) follow Level I guidance for PPE and containment and for a areas (>10 ft²) follow Medium (Level II) or when greater than 100 ft² follow Large (Level III) guidance for PPE and containment as discussed in Appendices B, C, and D)

A Small Isolated Area of Contamination (total surface area affected <10 square feet) in the HVAC System

The HVAC system should be shut down prior to any remedial activities.

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Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended (7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Areas of Contamination (Total surface area affected >10 square feet) in the HVAC System

The following procedures are recommended:

The HVAC system should be shut down prior to any remedial activities.

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from other areas. Isolate the HVAC system using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and removed in double-bagged 6-mil plastic. When a decontamination room is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

All areas should be left dry and visibly free from contamination and debris.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air (4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If remediation sampling is necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HAZARD COMMUNICATION

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When mold growth requiring Level III or IV (large-scale) remediation is found, the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners (1 and 3).

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CONCLUSION

In summary, the prompt remediation of contaminated material and infrastructure repair must be the primary response to mold contamination in buildings. The simplest and most expedient remediation that properly and safely removes mold growth from buildings should be used. Widespread contamination poses much larger problems that must be addressed on a case-by-case basis in consultation with a health and safety specialist. Effective communication with building occupants is an essential component of all remedial efforts. Individuals with persistent health problems should go to the local occupational health clinic or see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures.

REFERENCES

- 1. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Ventilation for Acceptable Indoor Air Quality ASHRAE Standard (ANSI/ASHRAE 62-2001). Atlanta, Georgia, 2001.
- New York City Department of Health: Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York: New York City Department of Health, Bureau of Environmental & Occupational Disease Epidemiology, (April 2000) January 2002.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (IICRC). *IICRC S500*, *Standard and Reference Guide for Professional Water Damage Restoration*, 2nd edition. 1999.
- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

Water Damage Cleanup and Mold Prevention

Appendix A presents strategies to respond to water damage within 24-48 hours. These guidelines are designed to help avoid the need for remediation of mold growth by taking quick action before growth starts. If mold growth is found on the materials listed in Appendix A, refer to Appendix B for guidance on remediation. Depending on the size of the area involved and resources available, professional assistance may be needed to dry an area quickly and thoroughly.

Water Damage - Cleanup and Mold Prevention			
Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mold Growth£			
Water-Damaged Material†	Actions		
Books and papers	 For non-valuable items, discard books and papers. Photocopy valuable/important items, discard originals. Freeze (in frost-free freezer or meat locker) or freeze-dry. 		
Carpet and backing - dry within 24-48 hours§	 Remove water with water extraction vacuum. Reduce ambient humidity levels with dehumidifier. Accelerate drying process with fans. 		
Ceiling tiles	Discard and replace.		
Cellulose insulation	Discard and replace.		
Concrete or cinder block surfaces	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. 		
Fiberglass insulation	Discard and replace.		

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Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	 Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. Check to make sure under flooring is dry; dry under flooring if necessary. 		
Non-porous, hard surfaces (Plastics, metals)	Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.		
Upholstered furniture	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture. 		
Wallboard (Drywall and gypsum board)	 May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible. 		
Window drapes	Follow laundering or cleaning instructions recommended by the manufacturer.		
Wood surfaces	 Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. Wet paneling should be pried away from wall for drying 		

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£ If mold growth has occurred or materials have been wet for more than 48 hours, consult Appendix B. Even if materials are dried within 48 hours, mold growth may have occurred. Professionals may test items if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then OSHA may have requirements for Personal Protective Equipment and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

- † If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.
- § The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

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APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*				
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment	
SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)				
Books and papers	3			
Carpet and backing	1, 3			
Concrete or cinder block	1, 3	Minimum None rec N-95 respirator, gloves, and goggles		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3			
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		None required	
Upholstered furniture & drapes	1, 3			
Wallboard (drywall and gypsum board)	3			
Wood surfaces	1, 2, 3			

MEDIUM - Total Surface Area Affected Between 10 and 100 ft ²				
Books and papers	3			
Carpet and backing	1,3,4			
Concrete or cinder block	1,3			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area	
Non-porous, hard surfaces (plastics, metals)	1,2,3			
Upholstered furniture & drapes	1,3,4			
Wallboard (drywall and gypsum board)	3,4			
Wood surfaces	1,2,3			
LARGE - Total Surface Area Affected Greater Than 100 ft ² or Potential for Increased Occupant or Remediator Exposure During Remediation Estimated to be Significant				
Books and papers	3			
Carpet and backing	1,3,4			
Concrete or cinder block	1,3	potential for remediator/occupant exposure potential for rer	Full	
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4		Use professional judgment, consider potential for remediator exposure and	
Non-porous, hard surfaces (plastics, metals)	1,2,3		size of contaminated area	
Upholstered furniture & drapes	1,2,4			
Wallboard (drywall and gypsum board)	3,4			
Wood surfaces	1,2,3,4			

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. Consult Appendix A if materials have been wet for less than 48 hours, and mold growth is not apparent. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

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Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

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Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above

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the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Posted to NGB FOIA Reading Room

May, 2018

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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Industrial Hygiene/ Preventive Medicine Mold Assessment Guide

TG 278 February 2002



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Industrial Hygiene/Preventive Medicine Mold Assessment Guide

Introduction

The USACHPPM Industrial Hygiene Field Services Program receives requests from industrial hygiene (IH)/preventive medicine (PM) field personnel for information about mold investigations and clean-up procedures. Like all organisms, molds have an absolute requirement for water. The types of mold and their abundance in an area depend on the availability of nutrients (i.e., dirt), water and temperature. Chronic water intrusion, lack of adequate ventilation and moisture control, and or isolated floods, such as a water pipe bursting, are typical conditions, which lead to mold growth in buildings.

When mold growth is present, the removal and cleaning of contaminated materials must be handled with proper precautions, because disturbing this growth can result in bioaerosol release, i.e., sending millions of spores into the air.

This mold assessment guide used in conjunction with the *ARMY Facilities Management Information Document on Mold Remediation Issues* (*TG 277*)¹ will assist Industrial Hygienists and or Preventive Medicine personnel in conducting mold investigations. Since a team approach is recommended, the collaboration between IH/PM personnel and facility management personnel is vital to correct moldy conditions and prevent future mold growth. Use the following procedures and refer to Appendix A: Mold Investigation Decision Logic, for guidance on mold investigation, evaluation, and remediation for routine assessments.

Air sampling for mold should never be part of a routine assessment. Remediation strategies can generally be made on the basis of a visual inspection or confirmation with a bulk or surface sample. In addition, air sampling methods for some mold are prone to false negative results and therefore cannot be used to definitively rule out contamination².

Safety Tips While Investigating and Evaluating Mold and Moisture Problems³

- Be careful not to touch mold or moldy items with bare hands.
- Do not allow mold or mold spores to get into your eyes.
- Do not breathe in mold or mold spores.
- Consult **Appendices B, C, and D** for Remediation, Personal Protective Equipment (PPE) to be used during remediation and Containment guidance.
- Consider using PPE when disturbing mold during investigation. Depending upon the situation, a half-face NIOSH-approved N-95 respirator, gloves, and goggles are recommended.

Communicate with building occupants at all stages of process, as appropriate¹.

When mold growth requiring Level III or IV (large-scale) remediation is found (See Appendix B), the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

Routine Investigation and Evaluation of moisture and mold problems³.

- Determine the total surface area of visible mold affected (square feet).
- Consider the possibility of hidden mold.
- Clean up small mold problems and fix moisture problems before they become large problems.
- Select remediation personnel or team based on the assessment.
- Investigate areas associated with occupant complaints.
- Identify source(s) or cause of water or moisture problem(s).
- Note type of water-damaged materials (wallboard, carpet, etc.).
- Check inside air ducts and air handling unit.

Assessments Requiring Sampling

Air sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician/medical practitioner desires to confirm the causative agent.

Pre- and post-remediation air sampling may be necessary if there is evidence from a visual inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination².

When air sampling is deemed necessary and is performed, outdoor air samples should be collected at the same time at the fresh air intake, which serves the suspected area. Values obtained should be compared and the indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air⁴. If they are different, bioamplification is occurring and the problem needs corrected.

Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', "Bioaerosols: Assessment and Control⁴."

Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program. For further mold assistance, contact USACHPPM, Industrial Hygiene Field Services Program, DSN 584-3118 or (410) 436-3118.

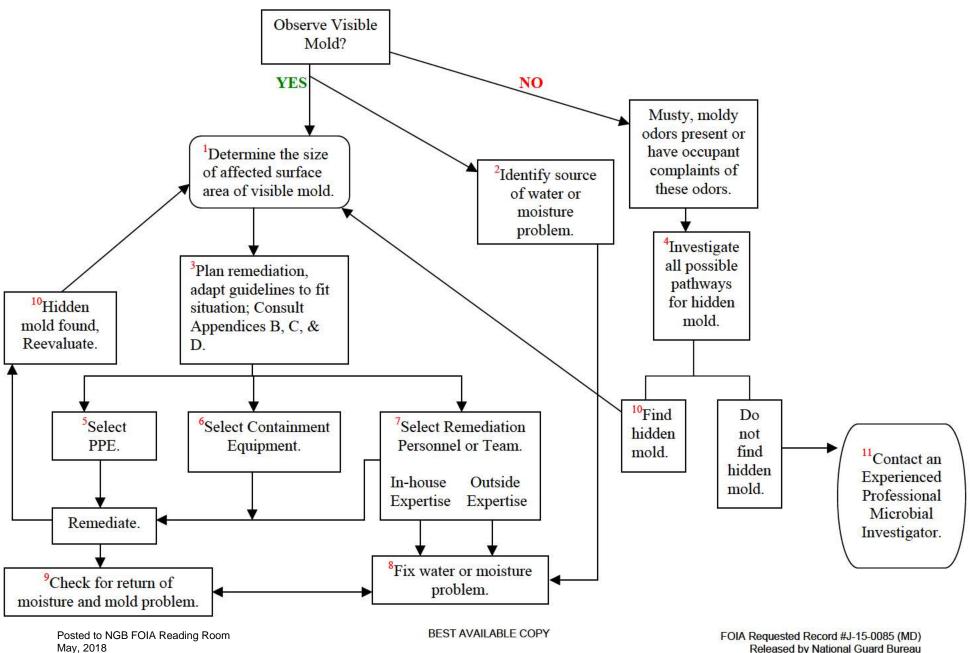
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- 3. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (IICRC). *IICRC S500*, *Standard and Reference Guide for Professional Water Damage Restoration*, 2nd edition. 1999.
- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

MOLD INVESTIGATION DECISION LOGIC

MOLD INVESTIGATION DECISION LOGIC



MOLD INVESTIGATION DECISION LOGIC NOTES:

- 1. Roughly approximate the total surface area of visible mold. Categorization of the remediation levels are sometimes borderline, so when trying to decide the category to apply, consider the extent of visible growth, such as a heavy blanket of growth on the surface, to barely visible. If heavy growth is apparent, consider moving up to the next level of protection.
- 2. Do not skip this step. Address the source of water or moisture problem or the mold will simply reappear.
- 3. Always protect the health and safety of the building occupants and remediators.
- 4. Mold may be hiding on the backside of drywall, vinyl wallpaper, or paneling, the top of ceiling tiles, the underside of carpets and pads. Check walls behind furniture, pipe chases and utility tunnels, porous thermal or acoustic liners inside ductwork, or check the rafters (due to roof leaks or insufficient insulation)³.
- 5. Utilize appendices B and C for remediation guidance. Use your best judgment during investigations, if not disturbing the mold you may need minimal to no PPE. Do not alarm building occupants unnecessarily, but protect yourself as necessary.
- 6. If the containment is working properly, the polyethylene sheeting will billow inwards on all surfaces. If it flutters or billows outward, containment has not been achieved, and you should find and correct the problem before starting your remediation activities³. Confirm negative pressure with smoke tubes.
- 7. Select remediation personnel who have the experience and training needed to implement the remediation plan.
- 8. You must completely fix or eliminate the water or moisture problem to solve the problem.
- 9. You should revisit the site(s) approximately two weeks after remediation, and it should show no signs of water damage or mold growth.
- 10. If you discover hidden mold, revise your plan by reassessing the size of moldy area.
- 11. If you believe that you have a hidden mold problem, you may want to consider hiring an experienced mold investigative professional.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

		s for Remediating Building Mate			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment		
SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)					
Books and papers	3				
Carpet and backing	1, 3		None required		
Concrete or cinder block	1, 3	_			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum			
Non-porous, hard surfaces (plastics, metals)	1, 2, 3	N-95 respirator, gloves, and goggles			
Upholstered furniture & drapes	1, 3				
Wallboard (drywall and gypsum board)	3				
Wood surfaces	1, 2, 3				
MEDIUM - Total Surface Area Affected Between 10 and 100 ft ²					
Books and papers	3				
Carpet and backing	1,3,4				
Concrete or cinder block	1,3	_			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area		
Non-porous, hard surfaces (plastics, metals)	1,2,3				
Upholstered furniture & drapes	1,3,4				
Wallboard (drywall and gypsum board)	3,4				
Wood surfaces	1,2,3				
		face Area Affected Greater Than 100 ft ² or diator Exposure During Remediation Esti			
Books and papers	3				
Carpet and backing	1,3,4				
Concrete or cinder block	1,3	Full	Full		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	potential for remediator/occupant exposure potential for remediator exposure	Use professional judgment, consider potential for remediator exposure and siz		
Non-porous, hard surfaces (plastics, metals)	1,2,3		of contaminated area		
Upholstered furniture & drapes	1,2,4				
Wallboard (drywall and gypsum board)	3,4				
Wood surfaces	1,2,3,4				

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber.
 Maintain area under negative pressure with HEPA filtered fan exhausted outside of building.
 Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

®TYVEK, DuPont de Nemours, E.I., & Co., Wilmington, DE.

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to

minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

Local Reproduction is Authorized and Encouraged.





1720 Walton Road Blue Bell, PA 19422 610-828-3078 Fax 610-828-7842

February 9, 2009

E-MAIL

Ms. Non-Responsive

NGB Regional Industrial Hygienist

Army National Guard ATTN: NGB-ARS-IHNE 301-IH Old Bay Lane

Havre de Grace, MD 21078

Subject: Draft Industrial Hygiene Assessment Report

Greenbelt Readiness Center, Greenbelt, Maryland 20770

IES Project No. EHS08794.02

Dear Non-Responsive:

IES Engineers (IES) is pleased to enclose the final report of the Industrial Hygiene assessment conducted at the Army National Guard Readiness Center facility located in Greenbelt, Maryland. Thank you for the opportunity to perform this assessment. Should you have any questions, please contact Non-Responsive or me.

Sincerely,



Senior Manager, Health, Safety & Industrial Hygiene Services

cc:





NATIONAL GUARD BUREAU REGION NORTH INDUSTRIAL HYGIENE OFFICE HAVRE DE GRACE, MARYLAND

FINAL INDUSTRIAL HYGIENE ASSESSMENT GREENBELT READINESS CENTER 7100 GREENBELT ROAD, GREENBELT, MARYLAND 20770 SURVEY DATE: JULY 22, 2008

IES PROJECT NO. EHS08794.02 REPORT DATE: FEBRUARY 9, 2009

Prepared and submitted by:	Certified Industrial Hygienist review by:
Non-Responsive	
Industrial Hygienist	, CIH Senior Manager, Health, Safety & Industrial Hygiene Services



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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Assessment Date: July 22, 2008

Purpose: The National Guard Bureau (NGB) retained IES Engineers (IES) to assist it in

performing an Industrial Hygiene assessment at the Army National Guard (ARNG) Readiness Center (RC) located at 7100 Greenbelt Road in Greenbelt, Maryland. The purpose of the Industrial Hygiene survey was to identify and measure the existence and extent of potentially hazardous operations or conditions at the ARNG facility. Mr. Non-Responsive, Industrial Hygienist, of IES, performed the assessment under the direction of Mr Non-Responsive CIH, Senior Manager, Health, Safety & Industrial Hygiene Services, of IES. The assessment included: evaluations of operations, including engineering, work practice, administrative, and/or personal protective equipment (PPE) controls; ventilation system evaluations, including visual observations of airflow and quantitative assessments of general ventilation systems; illumination

measurements and observations of the facility and conditions

Conferred With: SFC Non-Responsive, Supervisor, Greenbelt Readiness Center

1.2 Facility Description

Greenbelt RC, located at 7100 Greenbelt Road, Greenbelt, Maryland is an 11,430-square foot training facility constructed of an interior of concrete masonry on a concrete slab with a brick exterior. Associated with the RC are offices, storage rooms, kitchen, boiler room, assembly hall, recruitment office and latrines. Photographs of the facility and maintenance activities are located in Appendix A of this report.

The RC is a two story training facility. The facility is ventilated through window-mounted air-conditioning units in a majority of the offices. Normal working hours for the six full time personnel two supervisors, two caretakers and two recruiters) are generally Tuesday through Friday from 0630 to 1700.



1.3 Findings and Conclusions

The main findings and conclusions of the assessment are:

- On the day of the assessment there were six on-site personnel. During a normal 10-hour day, the supervisors perform logistical work while the caretakers maintain the facility and grounds.
- Airborne lead was not detected in either of the two general area (GA) air samples collected on the day of the assessment. The airborne lead concentrations in each of the air samples were reported at less than 3.4 micrograms of lead per cubic meter of air (μg/m³), which is well below the OSHA Action Level of 40 μg/m³ for lead over a 10-hour workday.
- Wipe samples for lead that were collected from various horizontal surfaces throughout the Readiness Center indicated that the surface lead concentrations in certain areas exceeded the recommended precautionary level of 200 micrograms of lead per square foot of surface sampled (µg/ft²). Additional cleaning using HEPA filtered vacuum systems and/or wet methods is recommended for these areas to help further reduce the potential for personnel exposure to lead.
- The average illuminance levels in some areas throughout the facility were below the recommended values. Although the lower-than-recommended lighting levels are not expected to present an imminent hazard, safety and ergonomic improvements could result from enhanced lighting in these areas.
- The majority of building materials present within the RC were in good condition on the day of the Industrial Hygiene Assessment. However, IES observed deteriorating paint within the kitchen, boiler room and Copy/Mail Room within the facility. IES collected paint chip samples from these areas and determined that they were not classified as lead-based paint. IES also collected a bulk sample of the damaged 9-inch by 9-inch floor tile in the Copy/Mail Room and found that the flooring material contained less than 1% asbestos, by weight.
- The air temperatures within the facility ranged from 75.6°F to 82.6°F, as compared to an outdoor temperature of 86.5°F. Two of the temperatures collected inside the building exceeded what is considered comfortable, as recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). These areas, the Lounge and the Assembly Hall, were not occupied on the day of the assessment. All areas that were within the comfort parameters, set forth by ASHRAE, were ventilated by window-mounted air conditioning units. IES was informed that the facility is in the process of having all the windows replaced and all individual rooms will have window-mounted air-conditioning units installed. Indoor relative humidity ranged from 37.4% to 59.7% in the facility, as compared to an outdoor level of 62.9%. These levels are within the recognized comfort range of 30 to 60%, however, relative humidity levels above 60% are conducive to microbial growth for cellulose-based building materials such as drywall and ceiling tiles.



- Trace amounts of asbestos were found in the black 9"x9" floor tiles in the Mail/Copy Room within the Readiness Center. Approximately 1 square foot of damaged materials were identified during the assessment.
- Several health and safety items were identified during the comprehensive survey. These included:
 - o Fire extinguishers were last serviced in 2006 and were not visually inspected since January 2007
 - o IES observed brown water coming from a number of sinks and shower heads in the facility
 - o Emergency lighting at the entrance to the Assembly Hall did not light when tested

1.4 Recommendations

IES' recommendations resulting from this assessment are included in a separate document entitled, "Greenbelt_RC_Recommendations."



2.0 OPERATION DESCRIPTION

INSTALLATION: RC Army National Guard

BUILDING: 7100 Greenbelt Road, Greenbelt, Maryland 20770

LOCATION: Site wide

OPERATION DESCRIPTION: On the day of the assessment, IES witnessed routine operations for the RC. Two caretakers were performing general maintenance on the facility and the grounds. This includes cleaning the latrines, cleaning windows and other building materials. Supervisors were performing logistical tasks within the office areas. IES was informed that these activities commence on a routine basis. Training at the RC occurs once a month, a weekend at a time.

CHEMICAL AND PHYSICAL AGENTS SAMPLED: General area air sampling for lead was performed on the day of the assessment during what is considered routine operations when training is not taking place at the facility. General IAQ measurements were made throughout the facility to evaluate ambient conditions on the day of the assessment.

VENTILATION SYSTEM EVALUATION: The facility is not conditioned by a single air handling system. Individual offices are ventilated with window-mounted air-conditioning units.

LIGHTING: The average illuminance levels in several areas throughout the shop were below the recommended values. Refer to Section 3.3 of this report for a summary of the lighting measurements.

INTERPRETATION OF RESULTS: The general area lead sample results suggest that the likelihood of personnel exposure to airborne lead dust is low. Wipe samples for lead that were collected from various horizontal surfaces throughout the Readiness Center indicated that the surface lead concentrations in certain areas exceeded the recommended precautionary level of 200 µg/ft². Although there is limited correlation between surface lead contamination and airborne lead exposures, it is recommended that the affected areas be thoroughly cleaned using HEPA filtered vacuum systems and/or wet methods. The average illuminance levels in some areas throughout the facility were below the recommended values. Although the lower-than-recommended lighting levels are not expected to present an imminent hazard, safety and ergonomic improvements could result from enhanced lighting in these areas. Temperatures within the Lounge and Assembly Hall exceeded the recommended range of temperatures set forth by ASHRAE and relative humidity levels approached the upper limits for indoor air quality. Although indoor humidity levels were high, IES did not observe any mold growth or water-damaged materials that would be conducive for mold growth. Paint chip samples collected during the assessment were found not to contain lead.



3.0 SAMPLE RESULTS AND MEASUREMENTS

3.1 Air Sampling

3.1.1 Indoor Air Quality

Measurements of air temperature, relative humidity, and CO₂ and CO concentrations were made using a calibrated direct reading hand-held TSI Q-Trak Indoor Air Quality instrument. The carbon monoxide sample results were compared with the Threshold Limit Values (TLVs) for exposure assessment purposes. TLVs are established by the American Conference of Governmental Industrial Hygienists (ACGIH) and are published annually in ACGIH's *TLVs and BEIs*. They refer to airborne exposure concentrations and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. However, because of wide variations in individual susceptibility, a small percentage of workers may experience discomfort from or be affected by some substances at concentrations below the recommended threshold limit.⁽¹⁾

Table 1 details the air temperature, relative humidity, CO₂, and CO measurements collected throughout the building during the assessment. Refer to the Indoor Air Quality maps in Appendix B for the IAQ measurements at each location throughout the facility.

TABLE 1 AIR TEMPERATURE, RELATIVE HUMIDITY, CO₂, AND CO MEASUREMENTS

Date of Assessment: July 22, 2008

Location: National Guard RC, Greenbelt, Maryland Analyte(s): CO₂, CO, Temperature, and Relative Humidity

Exposure Guidelines: CO₂: Indoor CO₂ concentrations should be maintained at less than 700 ppm

above outdoor air levels (ASHRAE 62.1-2007)⁽²⁾

CO: 25 ppm (ACGIH TLV-TWA)

Temperature: 68 °F to 79 °F (ASHRAE 55-2004)⁽³⁾ Relative Humidity: 30% to 60% (ASHRAE 55-2004)⁽³⁾

Sample ID	Sample Description	Start - End Time (hh:mm)	Sample Time	CO ₂ (ppm)	CO (ppm)	Measured Temperature (°F)	Measured Relative Humidity (%)
A	Lounge - Area Sample (AS) – Approximately four feet above the ground at the center of the Lounge.	1002 – 1006	4 Min.	503	0	82.5	57.3
В	Assembly Hall – AS – Approximately four feet above the floor at the center of the Assembly Hall.	1006 – 1010	4 Min.	453	0	82.6	59.7
С	Conference Room – AS – Approximately four feet above the floor at the center the Conference Room.	1010 – 1014	4 Min.	594	0	75.8	56.9
D	Non-Responsive Office – AS – Approximately four feet above the floor at the center of Non-Responsive Office.	1014 – 1018	4 Min.	592	0	75.6	37.4



Sample ID	Sample Description	Start - End Time (hh:mm)	Sample Time	CO ₂ (ppm)	CO (ppm)	Measured Temperature (°F)	Measured Relative Humidity (%)
Е	Classroom – AS – Approximately four feet above the floor at the center of the Second Floor Classroom.	1018 – 1022	4 Min.	535	0	77.6	43.5
F	four feet above the floor at the center of Office.	1022 – 1026	4 Min.	552	0	78.1	43.3
G	Quarters – AS – Approximately four feet above the floor at the center of the Second Floor Quarters.	1026 – 1030	4 Min.	611	0	80.5	42.3
Н	Outdoor – AS – Approximately four feet above the ground outside of the RC.	1030 – 1034	4 Min.	409	0	86.5	62.9

Note: - All airborne CO2 and CO concentrations are expressed in parts of contaminant per million parts of air (ppm)

Refer to Section 6.0, Equipment and Calibration Data, for the calibration data for the equipment used to perform the IAQ survey.

3.1.2 Airborne Lead Sampling

Air samples for lead were collected with personal air sampling pumps on 0.8 μm mixed cellulose ester (MCE) filters. All sampling pumps were calibrated before and after the sampling period with a primary gas flow standard. Area samples were collected as a part of this assessment. Following the assessment, the air samples and an appropriate number of field blanks were shipped via overnight courier to AMA Analytical (AMA) in Lanham, Maryland, which is accredited by the American Industrial Hygiene Association (AIHA) for analysis and participates in the Environmental Lead Accreditation Program (ELAP). The air samples were analyzed for lead using the EPA 600/R-93/200 Flame Atomic Absorption Spectroscopy (FAAS) method. All air sample results were reported in micrograms of lead per cubic meters of air sampled (μg/m³) for the purposes of this assessment.

Air sample results for lead were compared to the Action Level and Permissible Exposure Limits (PELs) published in OSHA 1910.1025, the expanded health standard for lead. Action Levels and PELs are promulgated through the OSHA rule-making process and act as legal limits for exposure in the work place. They are intended to provide protection to employees who are potentially exposed to airborne contaminants. The Action Level for lead is expressed in terms of an 8-hour time-weighted average (TWA) contaminant concentration. The PEL for lead is expressed in terms of 8-hour TWA. Copies of the OSHA regulations are available through the local OSHA Area Office, in the Federal Register, or on the OSHA website at www.osha.gov. (4)

This report's findings are based on the lead samples collected during the assessment, which are summarized in Table 2. Refer to Appendix C for the complete laboratory air sample analysis results. Worksite Sampling Data Records are included in a separate document entitled, "Greenbelt RC Medical."



TABLE 2

AIRBORNE LEAD SAMPLING RESULTS SUMMARY

Date of Monitoring: July 22, 2008

Location: Army National Guard RC, Greenbelt, Maryland

Analyte(s): Lead

Occupational Exposure Limits: Lead: OSHA PEL-TWA = 50 µg/m³

OSHA Action Level (TWA) = $30 \mu g/m^3$

Sample ID	Equipment ID	Sample Description	Start Time	End Time	Sample Time (Min.)	Flow Rate (lpm)	Air Volume (I)	Measured Airborne Contaminant Concentration
072208- A001	103	SGT Mon-Responsive Office – Area Sample - Operator Breathing Height (AS-OBH) – During normal operations within the Greenbelt Armory.	0705	1422	437	1.99	874.0	<3.4 μg/m ³
072208- A002	104	SFC Office –AS-OBH – During normal operations within the Greenbelt Armory.	0705	1422	437	1.99	883.0	<3.4 μg/m ³

Note: - Sample results for lead are expressed as micrograms contaminant per cubic meter of air (μg/m³)

PEL-TWA = OSHA Permissible Exposure Level, 8-Hour TWA

3.2 Lead Dust Sampling

IES performed wipe sampling in the Assembly Hall, converted rifle range and in select areas throughout the facility. All wipe sampling was performed in accordance with: best Industrial Hygiene practices and the guidelines published in Section II: Chapter 2, Sampling for Surface Contamination, of the OSHA Technical Manual. The wipe samples were collected over 100 square centimeters areas using pre-wetted Ghost Wipes. The wipe samples collected as a part of this assessment, along with appropriate field blanks, were shipped to AMA for analysis and were analyzed using the NIOSH 7082 flame atomic absorption spectrophotometer (FAAS) method. All wipe sample results were reported in micrograms of lead per square foot of surface sampled ($\mu g/ft^2$) for the purposes of this assessment.

This report's findings are based on the lead samples collected during the assessment, which are summarized in Table 3. Refer to Appendix C for complete laboratory wipe sample analysis results and Appendix D for the sample locations. Worksite Sampling Data Records are included in a separate document entitled, "Greenbelt RC Medical."



TABLE 3 – WIPE SAMPLE RESULTS SUMMARY

Date of Monitoring: July 22, 2008

Location: Army National Guard RC, Greenbelt, Maryland

Analyte(s): Lead

Occupational Exposure Limits: ARNG Recommended Cleaning Level = $200 \mu g/ft^2$

Sample ID	Location	Area of Surface Sampled	Measured Lead Surface Contamination (μg/ft²)
072208-SW001	Assembly Hall -Wipe Sample (WS)- Top surface of bulletin board near Kitchen	100 cm^2	660
072208-SW002	Assembly Hall -WS-Top surface of electrical panel near garage	100 cm^2	150
072208-SW003	Assembly Hall -WS-Surface of floor at center court	100 cm^2	350
072208-SW004	Kitchen -WS-Surface of Piedmont refrigerator	100 cm^2	170
072208-SW005	Copy/Mail Room -WS-Surface of floor	100 cm^2	220
072208-SW006	Conference Room 121 -WS-Surface of the center filing cabinet	100 cm^2	<110
072208-SW007	Conference Room 121 -WS-Surface of the book shelf	100 cm^2	270
072208-SW008	Conference Room 121 -WS-Surface of the top of the chalkboard	100 cm^2	460
072208-SW009	Non-Responsive Office -WS-Surface of filing cabinet	100 cm^2	<110
072208-SW010	Non-Responsive Office -WS-Surface of small refrigerator	100 cm^2	<110
072208-SW011	Second Floor Conference Room -WS-Surface of desk in front row	100 cm^2	<110
072208-SW012	Second Floor Conference Room -WS-Surface of cabinet	100 cm^2	160
072208-SW013	Office -WS-Surface of filing cabinet	100 cm^2	<110
072208-SW014	Office -WS-Surface of desk top	100 cm^2	<110
072208-SW015	Quarters -WS-Surface of table with microwave	100 cm^2	180
072208-SW016	Converted IFR-WS-Exhaust ventilation duct at the front of former IFR	100 cm^2	130
072208-SW017	Converted IFR-WS-Exhaust ventilation duct at the center of former IFR	100 cm^2	<110
072208-SW018	Converted IFR -WS-Floor at center of Locker area	100 cm^2	700
072208-SW019	Converted IFR -WS-Top of locker in the Supply section	100 cm^2	600
072208-SW020	Converted IFR -WS-Surface of floor outside of the former range	100 cm^2	520

3.3 Illuminance Survey

The illumination survey was performed pursuant to best Industrial Hygiene practices and the guidelines found in the ARNG document entitled, "Evaluation of Lighting Standing Operating Procedure (SOP) and Illumination Requirements for Existing Facilities," dated November 17, 2007. All measurements were made in slow response mode and were expressed in foot candles (fc). The measurements were used to calculate average illuminance levels for each workspace. Based on the activities conducted in each workspace, the calculated average illuminance level was compared to the ARNG recommended illuminance values. This report's findings are based on the illuminance readings collected during the survey, which are summarized in Table 4. The data reported in this table represent the average illuminance readings from the accessible locations of the commonly occupied work areas of the facility. Refer to the Illuminance Readings maps in Appendix E for sample locations.



TABLE 4 ILLUMINANCE READINGS SUMMARY

Survey Dates: July 22, 2008

Location: Army National Guard RC, Greenbelt, Maryland

Sample ID	Sample Description	Average Illuminance Measurements (fc)	ARNG Recommended Illuminance Value (fc)
Α	Lounge - Center of room	12.9	10
В	Assembly Hall - Center of Hall	21.2	10
C	Lobby Area – Center of Lobby	39.9	10
D	Hallway - Center of First Floor Hallway	39.9	5
E	Non-Responsive Office - Center of office	40.7	50
F	Conference Room - Center of Room	25.8	30
G	Second Floor Hallway - Center of Hallway	39.9	5
Н	Office - Center of Office	107.0	50
I	Quarters - Center of Room	19.7	50
J	Class Room - Center of Room	25.6	50
K	Fire Support Team Office - Center of Office	35.6	50
L	Latrine - Center of latrine	34.2	7

Notes: - All illuminance measurements and recommended values are expressed in foot candles (fc)

Refer to Section 6.0, Equipment and Calibration Data, for the calibration data for the equipment used during the illumination survey.

4.0 ONSITE OBSERVATIONS

A copy of IES' field notes from this assessment is included in a separate document entitled, "Greenbelt RC Field Notes."

4.1 Physical Condition of RC

The majority of building materials present within the RC were in good condition on the day of the Industrial Hygiene Assessment. However, IES observed deteriorating paint within the kitchen, boiler room and the Copy/Mail Room within the facility. IES collected paint chip samples from these areas. IES also collected bulk building materials from the Copy/Mail Room to be analyzed for asbestos content. IES did not observe any mold growth or water-damaged materials that would be conducive for mold growth.

4.1.1 Deteriorating Paint Chip Sampling

IES performed a visual inspection of the building materials and observed deteriorating paint within the facility. IES collected three paint chip samples of various colors and substrates. The paint chip samples were shipped via overnight courier to AMA. The samples were analyzed for lead content



using the EPA 600 flame atomic absorption method. All sample results were reported in percent lead for the purposes of this assessment. Lead-based paint is considered any paint or surface coating that contains lead equal to or exceeding one milligram per square centimeter (mg/cm2) or is 0.5% lead by weight.

This report's findings are based on the paint chip samples collected during the assessment, which are summarized in Table 5. Refer to Appendix C for the complete laboratory sample analysis results.

TABLE 5 PAINT CHIP SAMPLING SUMMARY

Date of Assessment: July 22, 2008

Location: National Guard RC, Greenbelt, Maryland

Sample Number	Sample Location	Paint Color	Result
LBP-001	Painted Ceiling and Walls in Kitchen	White	0.28%
LBP-002	Painted Ceiling and Walls in Boiler Room	White	0.046%
LBP-003	Second Floor Ceiling	White	0.37%

4.1.2 Asbestos-Containing Materials Sampling

IES performed a visual inspection of the building and observed damaged building materials that could possibly be asbestos-containing materials (ACM). IES collected one bulk sample of building materials. The sample was shipped to AMA, a National Voluntary Laboratory Accredited (NVLAP) laboratory (NVLAP 101143-0) where they were analyzed by Polarized Light Microscopy (PLM), which classifies a material as asbestos-containing if it contains greater than one percent asbestos. A trace amount of asbestos was detected in the building material sample collected.

This report's findings are based on the bulk ACM samples collected during the assessment, which are summarized in Table 6. Refer to Appendix F for the complete laboratory sample analysis results.

TABLE 6 ASBESTOS CONTAINING MATERIALS SAMPLING SUMMARY

Date of Assessment: July 22, 2008

Location: National Guard RC, Greenbelt, Maryland

Sample Number	Sample Location	Material Color	Result
ACM-001	9"x9" Floor Tile in Mail/Copy Room	Black	Trace

Notes: - Trace = Trace amount of asbestos was found in simple.



4.2 Housekeeping

Housekeeping within the facility was generally good. IES observed no imminent slip, trip and fall hazards on the day of the assessment. All walking surfaces were clear of hazards and objects above the head were secured safety to the wall or columns to reduce the risk of head injuries.

5.0 EQUIPMENT AND CALIBRATION DATA

5.1 Sampling Equipment List

Table 7 lists the sampling equipment that was used as a part of the assessment.

TABLE 7 SAMPLING EQUIPMENT LIST

Equipment Type	Make/Model	Equipment/Serial Number	Equipment Identification
Personal Sampling Pump	MSA Escort ELF	103	103
Personal Sampling Pump	MSA Escort ELF	104	104
Primary Gas Flow Calibrator (Electronic Frictionless Piston)	Bios DryCal DC-Lite Model DCL-HM; S/N 101785	DryCal-ML	DryCal-ML
Light Meter	Extech Light Meter	401025	401025
Indoor Air Quality Monitor	TSI Model 8551 Q-Trak	51885	Q-Trak

5.2 Sampling Equipment Calibration Data

Table 8 details the calibration data for each piece of sampling equipment used during the assessment.

TABLE 8
SAMPLING EQUIPMENT CALIBRATION DATA

Equipment ID	Calibrator Used	Date of Pre- Sampling Calibration	Pre- Sampling Calibration Value (lpm)	Date of Post- Sampling Calibration	Post- Sampling Calibration Value (lpm)	Average Calibration Value (lpm)
103	DryCal-ML	7/22/08	2.01	7/22/08	1.99	2.00
104	DryCal-ML	7/22/08	2.02	7/22/08	2.02	2.02
DryCal-ML	Bench Calibrated 02/07/08	N/A	N/A	N/A	N/A	N/A
401025	NA	NA	NA	NA	NA	NA



Equipment ID	Calibrator Used	Date of Pre- Sampling Calibration	Pre- Sampling Calibration Value (lpm)	Date of Post- Sampling Calibration	Post- Sampling Calibration Value (lpm)	Average Calibration Value (lpm)
Q-Trak	Zero Gas/ Span Gas	7/22/08	Zero Gas: 0 ppm CO ₂ ; 0 ppm CO Span Gas 1,000 ppm CO ₂ ; 35 ppm CO	7/22/08	Zero Gas: 0 ppm CO ₂ ; 0 ppm CO Span Gas 1,000 ppm CO ₂ ; 35 ppm CO	Zero Gas: 0 ppm CO ₂ ; 0 ppm CO Span Gas 1,000 ppm CO ₂ ; 35 ppm CO

6.0 REFERENCES

- 1. ACGIH, 2008 TLVs and BEIs.
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), Standard 62.1-2007, "Ventilation for Acceptable Indoor Air Quality," ASHRAE, Atlanta, Georgia, 2004.
- 3. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), Standard 55-2004, "Thermal Environmental Conditions for Human Occupancy," ASHRAE, Atlanta, Georgia, 2004.
- 4. Occupational Safety and Health Administration, 29 CFR 1910.1025, Lead.
- 5. "Evaluation of Lighting Standing Operating Procedure (SOP) and Illumination Requirements for Existing Facilities," ARNG, 17 November 2007.

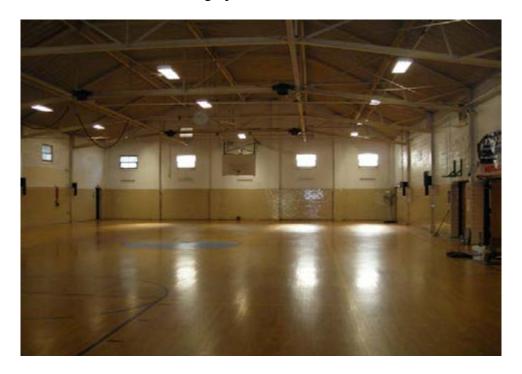


APPENDIX A FACILITY PHOTOGRAPHS





Photograph #1 – RC Exterior



Photograph #2 – RC Assembly Hall





Photograph #3 – Converted Rifle Range



Photograph #4 – Chipping Paint in the Mail/Copy Room





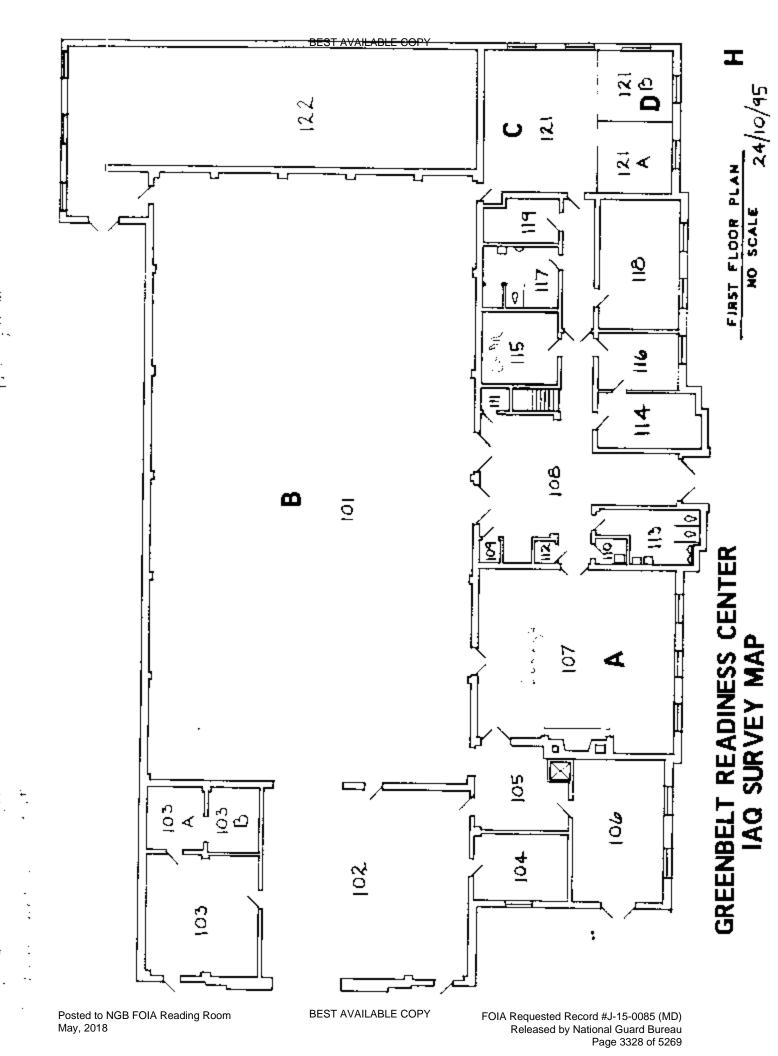
Photograph #5 – Damaged 9" x 9" Floor Tiles



Photograph #6 – Cardboard Guarding Exposed Wiring



APPENDIX B INDOOR AIR QUALITY SAMPLE LOCATION MAP





APPENDIX C

AIR, WIPE, AND PAINT CHIP SAMPLING RESULTS

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

ACCAROLITED ABOUTHO

Attention:

AMA Sample

Client Sample Number

Analysis Type

Sample Type

Number

Havre de Grace, Maryland 21078 State Military Reservation 301-IH Old Bay Lane, Attn: NGB-AVN-SI,

P.O. Number:

Not Provided

Address: Client

National Guard Bureau

Job Location: Job Number: Job Name: Silver Spring, MD Not Provided EHS08794.02

Date Submitted:

Chain Of Custody:

503008

Z

Person Submitting 7/29/2008

8/1/2008

Report Date:

Date Analyzed:

8/4/2008

FOIA Requested Record #5-0085 (MD)
Released by National Guard Bureau
Page 3331 of 5269

Summary of Atomic Absorption Analysis for Lead

Air Volume Area Wiped 3 Reporting Limit Final Result Comments

oe cwoon	LBP-003	LBP-002	LBP-001	072208-A003	072208-A002	072208-A001
	Flame	Flame	Flame	Flame	Flame	Flame
117:	Paint Chip	Paint Chip	Paint Chip	Air Blank	Air	Air
*	***	***	*	0	883	874
0 100	N/A	N/A	N/A	N/A	N/A	N/A
	0.01	0.01	10.0	3.00	3.40	3.43
	%РЬ	%P6	%Рь	ug/m³	ug/m³	ug/m³
				٨	٨	٨
020	0.37	0.046	0.28	ني	3.4	3.4
	%РЬ	%l%	%P%	9	ug/m³	mg/m³

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0874273

0874272 087427 0874270 0874269

0874277 0874276 0874275 0874274

072208-SW003 072208-SW002 072208-SW001

Flame

Flame

Wipe

**

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111.52

111.52 111.52 111.52

350 150 660

ug/ft²

0.108

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0874279 0874278

Flame

Flame Flame

Wipe Wipe

072208-SW013
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Wipe
07.108
111.52
08/ff2
07.208-SW013
Flame
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07.108 transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NYLAP, NIST, or any agency of the Federal Government. All rights reserved this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and to NGB FOIA Reading Room

0874286

072208-SW013 072208-SW012 072208-SW011 072208-SW010 072208-SW009

> Flame Flame Flame Flame Flame Flame Flame

Wipe Wipe Wipe Wipe

*** *** * * *

0.108 0.108 0.108

0.108

111.52 111.52 111.52 111.52 111.52 111.52

> ug/ft² ug/ft² ug/fi² ug/ft² ug/fi² ug/ft² ug/ft² ug/ft² ug/ft² ug/fi²

> > ٨

ug/ft² ug/ft²

110 110 110 460

սք/Ո²

60

ս**ջ/fil**² ug/ft²

0874285 0874284 0874283 0874282

072208-SW008

Wipe Wipe Wipe Wipe

*** ** **** *** * * * * * *

> 0.108 0.108 0.108

> > 111.52

270 10

ug/fi²

ug/ff² ug/ft² ug/ft²

ug/¶²

220 170

111.52 111.52

0.108

072208-SW007 072208-SW006 072208-SW005 072208-SW004

0874281 0874280

<u> An AIHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory</u>

AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Client National Guard Bureau Job Name: Not Provided Chain Of Custody:

Havre de Grace, Maryland 21078

State Military Reservation

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Attention:

Address:

P.O. Number: Job Number:

Not Provided EHS08794.02

Silver Spring, MD

Date Analyzed:

Person Submitting:

Date Submitted:

503008 7/29/2008

8/1/2008

Report Date:

8/4/2008

FOIA Requested Record #55-0085 (MD)
Released by National Guard Bureau
Page 3332 of 526

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Reporting Limit	ii g	=	Final Result	.	Comments
0874288	072208-SW014	Flame	Wipc	**	0.108	- :1	ug/lt²	۸ :	110	ug/ft²	
0874289	072208-SW015	Flame	Wipe	****	0.108	111.52	ug/ft ²		180	ug/ft²	
0874290	072208-SW016	Flame	Wipe	*****	0.108		ug/ft∂		130	ug/ft²	
0874291	072208-SW017	Flame	Wipe	**	0.108		ug/lt ⁻²	۸	10	ug/ft²	
0874292	072208-SW018	Flame	Wipe	* * * *	0.108	111.52	ug/ft²		700	ug/fl²	
0874293	072208-SW019	Flame	Wipe	* * * *	0.108		ug/ft²		600	ug/ft²	
0874294	072208-SW020	Flame	Wipe	**	0.108		ug/ft²		520	ug/ft²	
0874295	072208-SW021	Flame	Wipe Blank	* * * *	N/A		gu	Λ	12	96	
0874296	072208-SW022	Flame	Wipe Blank	***	N/A		ug G	٨	12	ug:	

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Note: All samples were received in good condition unless otherwise noted

ug = micrograms

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B

mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)

ug/L = parts per billion (ppb)

samples

NY ELAP accrediation applies only to paint chip, wipe, and water

See QC Summary for analytical results of quality control samples

associated with these sampes.

%Pb = percent lead by weight

N/A = Not Applicable

should not be considered when interpreting the result. Note: All results have two significant digits. Any additional digits shown

Air and Wipe results are not corrected for any blank results

Analyst:

Technical Manager:

G Edward Carney

to NGB FOIA Reading Room

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, of a locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness. This information, accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP NICT. AMA Analytical Services, Inc.

4475 Forbes Blvd. · Lanham, MD, 20706 · (301) 459-2640 · Toll Free (800) 346-0961 · Fax (301) 459-2643

LABOR	80220	802270	802220	072168	072208	302220	077708	801270	072208	072168 50002	07220	NG GLF	Other (specify)	C Grav.	L EPA F	PLM Bulk	Other (specify	LI AHERA	PC MCI	☐ Fiberglass	O NIOSH 7400.	PCM Air - PI	Asbestos Analysis	Comments	⊒24 Hours	APTE O Immediate		5. Phone # 6010	J. Address 2:		Client Name: 5	www. Vlailing/Bil	AIHA 4475 (301)	
TORY STA	072268 - Swoll	01220B-Sw010	32208-50009	772166-5W008	72208-SW007	72708 -Sixable	10.00	Sway	072208 50003	50002	072208-SWOD	CLIENT ID NUMBER	(specify	Grav. Reduction ELAP 198.6	LI EPA Point Count	PLM, Bulk FPA 600 – Visual Estimate	(specify	tA	PC MCE Porosityin a 25r	luss	O NIOSH 7400	PCM Air - Please Indicate Filter Type:	nalysis			Date Due		610 828	יי די	-	anne:	www.amalab.com Mailing/Billing loformation	(#100470) N Forbes Blvd. 459-2640 • (T THE STORY
LABORATORY STAFF ONLY; LCUSTODS 1. Date/Time RCVD:						The state of the s						SAMPLE INFORMATION SAMPLE LOCATION DATE IDENTIFICATION DATE		198.6	(ALO)	_		(QTY)	mer Type:	(QTY)	(QTY)	ilter Type:				AFTER HOURS (must be pre-scheduled)		28 3078		De la lie	Southery S	lion;	AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) 4475 Forbes Blvd. • Lanhum, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643	שאווו שווכויףנוכנו שפועוכפג, וזור.
R										-	7 22 88	ALTON VOLUME	(OTY)	_(QTY)	ς,	(XLD)	_QTY)								Q Next Day		Repor	Fax #. 6/6	ָרָרָרָרָרָרָרָרָרָרָרָרָרָרָרָרָרָרָר	1 KQ	3	,	(301) 459-2643	BIC.
PRO VISTOREX											/00 ₁₀ 2	E WIPE / E		(TEM Water samples	J 619 A 100.1	OELAP 19	LEM Water D Qual. (pres/abs)	🗓 Quan. (sd	☐ Qual. (pr	TEM Dust	El Residual Ash	HELAP 19	TEM Bulk		X 508+		Reporting Information (Results will be provided as soon as ten	828 784						
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By (Print) (A)								X 1.00 (1.00				MOLD AIR BULK		(C)	1010	(QTY)	(QTY)				OTS	(QTY)			大 Every Mucing W) Results Required	provided as soo	Submitted by:	Pen	Inh Location () /1/45	Job Name:	Sabmittal Information:	CUST	
FISHICA	<u>×</u>	X	X	7	X	×	*	\ 		X	X	DUST.	_	officewise flower.				iQTY)	(QTY)						empi Will Be	equired By Noon			-	879452	0		ODY	
cropo wino												TAPE SWAB	,	Surface Taye	Surface Swab	Mold - Direct M	E cast wife	Wuste Wa	Drinking Water	Suil/Solid	X 1	▶ Paint Chip	Lead Analysis	1 Verbals:		C S S	hnically feasible);	ŧ		# 0d			Zumb	(Pleas
Sign:			Date/Time:	The Martin March on the Control of t			Date/Time:				Date/Time:	NV.FI	-		- E	zidossar.	Langue Lwipe (A)		Vales	(5.7.	0.00	A Course out to	N			a Sheet	\$ \$ \$	Signature:	(ñ) mb ma *					(Please Refer To T
منه الأرد			Contact:	and the second s			Contact:				Contact:	HABORATORY STAFF ONLY)	CHIENT CONTACT	(QTY) 14 Other (Specify_	(QTY) \(\text{L}\) Surface Vacuum Dast	ੁੱਕ ਹ		(Aldi	(VIQ)	ry)	-	148 22 22			(2)	Ì	- UL £40434		610 826			Ich	80 0805	
Code			#5				By:				By:						BLE				4	(OTY)			TABAU CO	- ii.			57.38			\$	80(

Mailing/Billing Information: 072208-Sw012 572208-5wort 072208-5WO13 07208-Suco12 372208-SWOIS PCM Air -- Please Indicate Filter Type LMAir - Please Indicate Filter Type: Comments. 72208-Swall LABORATORY STAFF ONLY: (CUSTODY) 72208/5wol8 7126g -Swai7 sbestos Analysis 72706 50004 24 Hours Immediate Phone #: 610 Address 1: 1720 PC MCE Parosity. Grav. Reduction ELAP 198.6, EPA Point Count J Fiberglass PC MCE Porosity_ → Other (specify) NY State Friable 198.1 ☐ EPA 600 -- Visual Estimate_ ■ NIOSH 7402 LAHERA L NIOSH 7400 → Other (specify, NUMBER CLIENTID AFTER HOURS (must be pre-scheduled www.amalab.com (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643 AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) AMA Analytical Services, Inc. 4475 Forbes Blvd. • Lanham, MD 20706 4. Comments 3. Results Reported To: Date/Time Analyzed: 1. Date/Time RCVD:_ Time Due: Dale Due: $\frac{\alpha}{\alpha}$ SAMPLE INFORMATION SAMPLE LOCATION (QTY) in a 25mm 37mm in a 25mm 37mm DENTIFICATION (OTY) 3078 (STQ) _(QTY) (QTY) L (QTY) QTY) Fax # National Gward Bureau North VOLUME LITERS Immediate Next Day 2 Day Reporting Information (Results will be provided as soon as technically feasible): 610 828 784 6 (a) 803 TEM Water TEM Dust EM Bulk (2) All samples received in good condition unless otherwise noted. (TEM Water samples) Quan. (s/area)Dust D6480.99 NY State PLM/TEM ☐ ELAP 198.2/EPA 100.2 ☐ Qual. (pres/ahs) Vacuum/Dust_____ ☐ Quan. (s/area) Vacuum D5755-95 ☐ Residual Ash ELAP 198.4/Chatheld Qual. (pres/abs) By (Print) CHAIN OF CUSTODY Date Due TEM NORMAL BUSINESS HOURS ¥ a Submittal Information: X Submitted by Contact Perso Job # Job Name: Job Location QTY) By (Print): CYTO _(QTY) MOLDDate Results Required By Noon (Y10) CHSOB 794 [GT] _(QTY) Made to Accompodate) 110 (Every∧ttempt Will Be BU_{LK} 510 Q13) 3 .(QTY) X XX とう Sign: NATION PARAD Ī Mold - Direct Microscopic Analysis .rad Analysis O Fax Surface Swab _ Lar_E ☐ Dust Wipe I arnsce (wipe type 🗋 Drinking Water □ Soil/Solid Dust Wipe (wipe type Spore-Trap TATOLE: → Paint Chip office Directly 3 P.O. # WAR Time Number For Inquires) (Please Refer To This Signature Date/Time Date/Time Date/Tune Sign 6) jąty. (A.I.C) ...(QTY) '...l Other (Specify.... phune # 1010 628 3078 LABORATORY STAFF ONLY _ (QTY)`⊿ Surface Vacuum Dust Ĉ. (ALO) REPORT 10: hecis with Rer ! QTY CLIENT CONTACT L Bulk Contact Contact Contact Sypanifor initials (QTY) OTY 150 32 3 200 BEST AVAILABLE COPY Posted to NGB FOIA Reading Room

May, 2018

FOIA Requested Record #J-15-0085 (MD)

Released by National Guard Bureau

Page 3334 of 5269

Mailing/Billing Information: PLM Bulk
EPA 600 - Visual Estimate. PCM Air - Please Indicate Fifter Type: LEMAir - Pease Indicate Filter Type:
PC MCE Purosity...___in a 25mm 37mm Asbestos Analysis LABORATORY STAFF ONLY: (CUSTODY) omments 72208-24 Hours Immediate Client Name: 165 Phone #: 610. 828 CY Address 2: Address 1: PC MCE Porosity ☐ Other (specify) EPA Point Count L NIOSH 7402 Piberglass. L NIOSH 74(0) NY State Friable 198.1 JAHERA Other (specify_ Grav. Reduction ELAP 198.6. CLIENT ID NUMBER AFTER HOURS (must be pre-scheduled) www.aunalab.com (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643 4475 Forbes Blvd. • Lanham, MD 20706 AMA Analytical Services, Inc. aiha (#100470) NVLAP (#101143-0) NY ELAP (10920) 00 . જુ 2. Date/Time Analyzed: Comments: 3. Results Reported To: 8 Date/Time RCVD:_ Time Due: Date Due: 8 Disk. SAMPLE INFORMATION
SAMPLE LOCATION (KLO) 8 in a 25mm 37mm IDENTIFICATION PTS 3078 (QTY) National 10 (QTY) 1441 (YT9) (QTY) OTY) ÕTY) 2000 DATE Fax # Gweld Burren Region North 1H office Pirectly D Next Day CLITERS 6/0 Impedian Reporting Information (Results will be provided as soon as technically feasible): 828 6 9 WIPE AREA JEM Water IEM Dust EM Bulk (TEM Water samples) ☐ All samples received in good condition unless otherwise noted. 🗋 Quan, is/area iDust D6489-99 □ Residual Ash ☐ ELAP 198.2/EPA 100.2 Quan. (s/area) Vaceum D5755-95 Qual. (pres/abs) Vacuum/Dust UNY State PLM/TEM ☐ CPA 100.1 Qual. (pres/abs) TELAP 198.4/Charfield 2682 CHAIN OF CUSTODY __ 15y (Prmt) **25** Day + Ϋ́E r_{EM} NORMAL BUSINESS HOURS ANALYSIS ΥE Submittal Information: lob # EHS 0879910 Submitted by Contact Perso Job Location: Job Name: (An (QTY) QTY) Ć (QTY) By (Print) MOLD. Results Required By Noon .(QTY) Date: XXX (OTY) Made to Accomodate) 11R ã EveryAttempt Will Be V1/14 X BU_{LK} (CLD) QTY) DUST MATRIX らえら Sign Siring. Facto Mold - Direct Microscopic Analysis ead Analysis D Fax i_{AP_E} ☐ Surface Tape: Surface Swah Mair Wipe (wipe type glass two Spore-Trap ☐ Drinking Water MIN ■ Suit/Sulid ★Faint Chip。 PO SWAB Time Number For Inquires: (Please Refer To This Signature ų Date/Time: Date/Time Date Time Sign S _OTY) LiBulk -(QTY) _. (QTY) 🗕 Surface Vacuum Dust , (OTY) □ Other (Specify: ILABORATORY STAFF ONLY) Sheets with Report REPORT TO: CLIENT CONTACT QTY) Standing Sal & 500 3 Contact: Contact Contact S 25 Initials: 013 Œ . (QTY Ě æ By 0 BEST AVAILABLE COPY

FOIA Requested Record #J-15-0085 (MD)

Released by National Guard Bureau

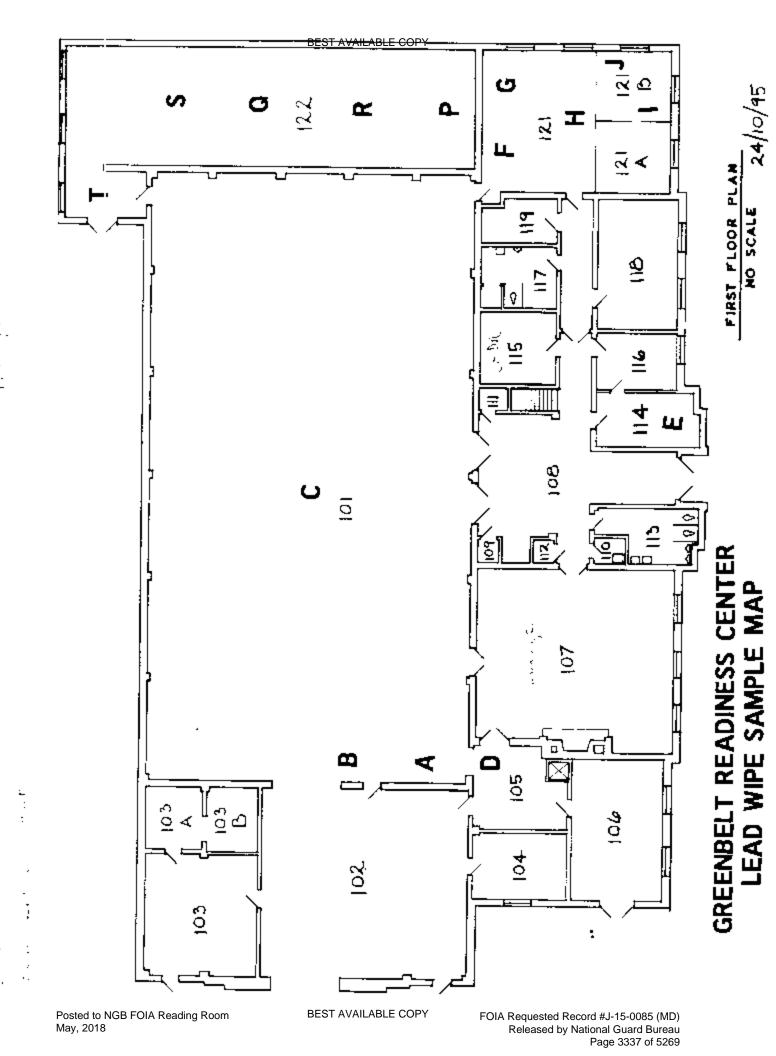
Page 3335 of 5269

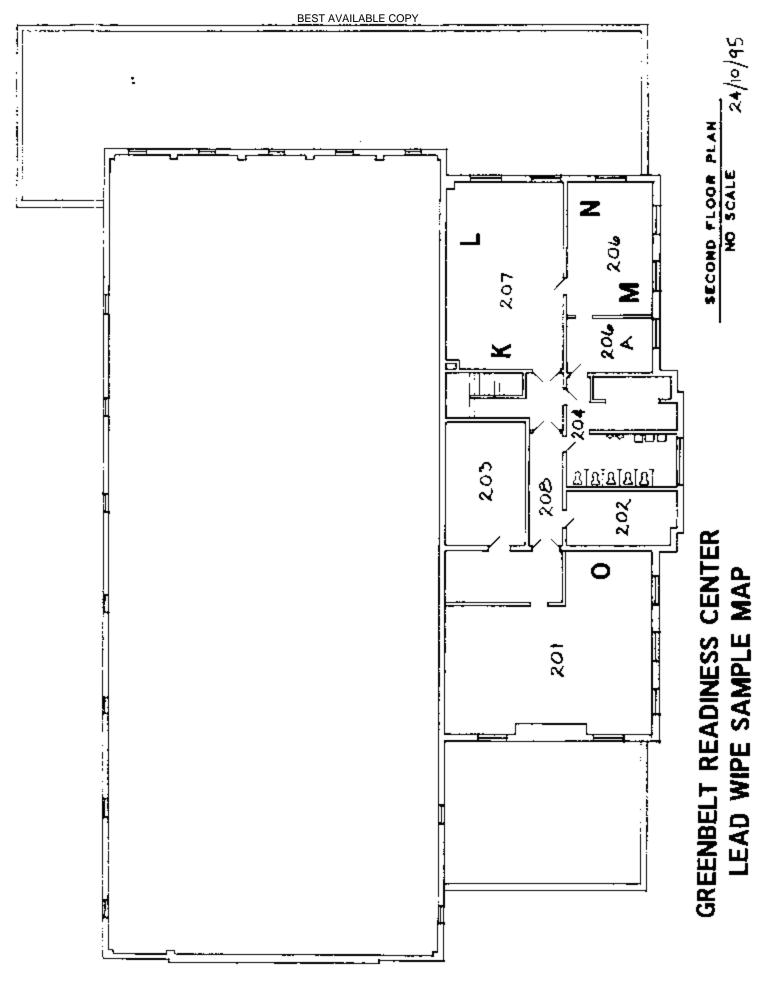
Posted to NGB FOIA Reading Room

May, 2018



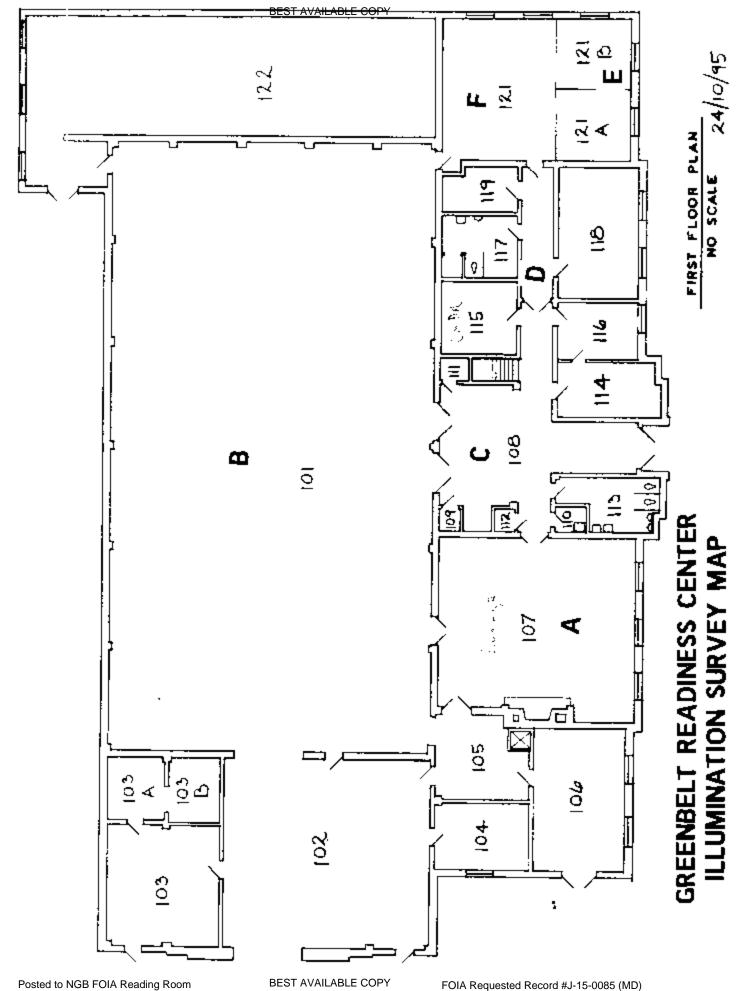
APPENDIX D WIPE SAMPLING LOCATION MAP







APPENDIX E ILLUMINANCE READING MAP



Posted to NGB FOIA Reading Room May, 2018

OIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 3340 of 5269



APPENDIX F ASBESTOS SAMPLE RESULTS

AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



Client:

National Guard Bureau

Job Name:

Not Provided

Chain Of Custody:

503008

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Silver Spring, MD

Date Analyzed:

8/1/2008

Address: State M:

State Military Reservation

Havre de Grace, Maryland 21078

Job Number:

EHS08794.02

Person Submitting:

Non-Responsive

Attention:



P.O. Number: Not Provided

Page I of I

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #		-			Wool	Percent		Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
					 	·		 					
0874297	ACM-001	TR 1	TR		 			 	 100	Black	Homogeneous	LBP	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- 1 TEM RECOMMENDATION Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- 2 MATRIX REDUCTION RECOMMENDATION Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

Uncertainty: For samples containing asbestos in range of 1-10% the CV is 0.43, 11-35% CV=0.55, >35 CV=0.23

Lon Butrai

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Industrial Hygiene Survey

National Guard Facility Greenbelt Armory 7100 Greenbelt Road Greenbelt, MD 20770

Prepared For:

National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location:

Greenbelt Armory

7100 Greenbelt Road Greenbelt, MD 20770

Prepared By:

Analytical Laboratory Services, Inc.

3544 North Progress Avenue

Suite 100

Harrisburg, PA 17110

Survey Date:

September 2, 2010

Report Date:

October 13, 2010

ALSI Project #: lon-Responsive 1009572

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Director, Environmental Health & Safety

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Section 1.0 Executive Summar

Section 1.0 Executive Summary

An industrial hygiene survey was conducted on September 2, 2010, at the Greenbelt Armory located at 7100 Greenbelt Road, Greenbelt, MD 20770. The survey was performed by Ms. Non-Responsive and Mr. Non-Responsive

- 1. Lead surface and air samples were collected. All sample results were less than recommended guidelines or regulatory standards.
- 2. Lighting levels met the minimum recommended guidelines in all tested locations except for the Maintenance Office. Lighting should be improved in this area.
- 3. Indoor air quality parameters of temperature, relative humidity carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment. Relative humidity exceeded the recommended ceiling of 60% in one location and temperature was higher than the recommended criteria of 73 degrees F in all tested locations. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.
- 4. Water damaged ceilings, walls, and roof leaks are present in a few areas. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced.
- 5. Damaged, suspect asbestos containing floor tile were observed in the lounge and maintenance office. Damaged areas of suspect asbestos containing material should be properly abated or repaired.

Section 2.0 Operation Description & Observations

Section 2.0 Operation Description & Observations

The Greenbelt Armory is mainly an administrative facility with many offices, training and storage areas. There were approximately 10 full-time employees stationed at this facility at the time of this survey.

The building was initially constructed in 1954. In 2009 a large storage area was added to the building. The exterior is brick and masonry. The interior walls are primarily block, plaster, or drywall. The floors are concrete with some vinyl floor tile.

There is no central heating, ventilating, and air conditioning system (HVAC) present. A few air conditioners are present in the building. Outdoor air ventilation occurs via open doors and windows. Some doors and windows were open on the day of this survey.

There is an old firing range in the building. It was closed in the 1970's and has been fully abated. It is now a weight/exercise room.

There is no child-care facility in the building.

Overall housekeeping was poor. Some areas were dirty and cluttered. Housekeeping should be improved.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. Personnel had supportive chairs.

Section 3.0 Noise Survey

Section 3.0 Noise Survey

Employees were not performing tasks that provided excessive noise levels. Therefore, noise exposure monitoring was not conducted.

Section 4.0 Lead Testing

Section 4.0 Lead Testing

At the time of the assessment, no activities were observed which would generate lead exposure. The facility contains an area which was once an indoor firing range. It has been fully abated and is now a weight room.

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Air ug/m³	Surface ug/ft²	Paint Chip %Pb
1	Orill Hall	<3.4	··· - -	
	First Floor Conference Room	<3.3		-
3	Blank	<3 <u>(ug)</u>		
	Lounge - Floor		<u><110</u>	<u> </u>
5	Drill Hall Floor (Left)		<110	
6	Drill Hall – Floor Outside Converted Firing Range		<110	
7	Drill Hall - Top of Ceramic Block Lower Wall	. .	130	
8	Drift Hall - Floor (Center)		<110	!
9	Maintenance Office - Desktop		!20	<u> </u>
10	Kitchen - Top of Stove		<110	
1!	Weight Room Converted Firing Range - Window Sill		<1 0	
12	Converted Firing Range - Floor by Equipment		<110	
13	Converted Firing Range - Top of Light		<110	
14	Conference Room Top of Baseboard Heater		<110	
15	Recruit Office - Top of Cubicle - Shelf		<110	:
16	Entry Floor		<110	
17	Second Floor Classroom - Window Sill		<110	
18	Blank		<12 (ug)	
Criteria		50	200	i = 0.5

Key: Bolded results exceed listed criteria

Lead surface and air samples were collected. Surface levels of lead did not exceeded 200 ug/ft² in any areas sampled.

The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. In the "Derivation of Wipe Surface Screening Levels for Environmental Chemicals," the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³. In fact, no detectable level of lead was identified in the air samples collected.

Deteriorated paint was observed in a few locations throughout the facility. Delaminated paint was mostly due to water leaks or age along with prolonged exposure to elevated relative humidity levels.

Section 5.0 Lighting

Section 5.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400L Precision Light Meter (Serial No. K070003). The light meter was last calibrated on November 26, 2009. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended Lighting	Sufficient Lighting
Lounge/Game Room	60.5	30-50	Yes
Orill Hall	51.3	30-50	Yes
Readiness NCO	74.2	30-50	Yes
Training NCO	41.2	30-50	Yes
Conference Room	48.8	30-50	Yes
Unit Supply NCO	1 42.2	30-50	Yes
Large Back Supply Room	42.8	30-50	Yes
Kitchen	57.9	50	Yes
Maintenance Office	21.7	30-50	No
Weight Room - Converted Firing Range	83.3	30	Yes
Second Floor Classroom	86,1	30-50	Yes
Second Floor Office with Cubicles	76.6	30-50	Yes

Lighting levels met the minimum recommended guidelines in all tested locations except for the Maintenance Office. Lighting should be improved in this area.

Section 6.0 Indoor Air Quality

Section 6.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter. Model 7565X (Sorial # 0839020). The IAQ Meter was last calibrated in March 2010.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior of the structure ranged from 83.3 to 89.1 degrees F with relative humidity readings ranging from 47.6% to 60.7%. During the survey, carbon dioxide (CO₂) levels ranged from 434 ppm to 554 ppm within the facility compared to an outdoor CO₂ level of 439 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO₂ recommended is 1.139 ppm (439 ppm + 700 ppm). Carbon monoxide (CO) tanged from 0.5 – 3.5 ppm.

The following table summarizes the measurements collected.

	IAQ Assessment	Summary		
Location	Temperature («F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Outdoors	91,0	51.1	449	1.8
Lounge/Game Room	89.1	47.6	516	3.5
Drill Hall	84.7	54.7	448	2.1
Readiness NCO	84.0	51.3	495	2.0
Training NCO	84.0	52,1	554	1.5
Conference Room	84.7	55.4	468	1.5
Unit Supply NCO	84.7	51.9	528	1.2
Large Back Supply Room	83.7	57.0	439	1.3
Kitchen	83.3	58.8	434	1.0
Maintenance Office	83.5	56.0	464	1.3
Weight Room Converted Firing Range	83.8	60.7	523	1.2
Second Floor Classroom	86,9	57.4	464	0.5
Second Floor Office with cubicles	88.0	53.2	437	1.1
Outdoors	91.3	53.6	429	0.8
Criteria	73.0-79.0	30-60	<1,139	[<9.0

Key: Bolded results exceed listed criteria

Relative humidity exceeded the recommended ceiling of 60% in one location. Temperature exceeded the recommended criteria of 73 degrees F in all indoor locations. There is no central air conditioning system in the building. There are a few window or portable air-conditioners in the building. Outdoor conditions were hot and humid. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.

Carbon dioxide levels did not exceed the recommended ceiling of 1,139 ppm. This suggests that outdoor air ventilation is adequate in this area. There is no mechanical ventilation system for this facility. Outdoor air ventilation is provided by open windows and doors.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- 1. Water damaged ceilings and roof leaks are present in a few areas. Paint is peeling on the Drill Hall wall. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced.
- 2. No visible fungal growth was observed.
- 3. There is no central air-conditioning in the building.

Section 7.0 Suspect Asbestos Containing Building Materials

Section 7.0 Suspect Asbestos Containing Building Materials

Suspect asbestos containing materials (ACM) include shectrock/joint compound, plaster wall and ceiling systems, floor tiles and associated mastic, and vinyl cove base. Thermal system insulation which is most likely a combination of paper wrapped fiberglass with PVC elbows and well as pre-formed TSI with mudded elbows was suspected. No samples were collected. Inaccessible areas were not inspected.

The following are the most notable findings regarding suspect ACM at the time of this survey:

- 1. $9^{\circ}x$ 9° green and black vinyl floor tile are present in many areas. An estimated 4,000-5,000 ft² of this floor tile was observed.
- 2. Damaged floor tile were observed in the lounge and maintenance office. Damaged areas of suspect ACM should be properly abated or repaired.

Section 8.0 Maintenance Bay

Section 8.0 Maintenance Bay

There is no garage area at this facility.

Section 9.0 Limitations

Section 9.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings berein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Analytical Laboratory Services, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A Laboratory Analysis Report

ama Analuical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

AHALAP, LLO

9/16/2010 Report Date: 9/16/2010 9/9/2010 508722 Person Submitting: Chain Of Cristody; Date Submitted; Date Analyzed: W912K6-09-A-6003 BG John R. Kenly Greenbelt, MD Not Provided Job Location: P.O. Number: Job Number: Job Name: 301-IH Old Bay Lane, Attn: NGB-AVN-SI, Havre de Grace, Maryland 21078

Page 1 of 2

Page 1 of 2	Comments
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submitted and accepted for the exclasive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prins where pursons and many and completeness of these Laboritaries, we expressly disclaim any knowledge and itability for the accuracy and completeness of this liberial configuration. Residual sample majoritation the ingramphor regulatory guidelines, unless otherwise regulatory of the circumstance of the meaning the disearched in accordance with the appropriate regulatory guidelines, unless otherwise regulatory of AREBA air samples. This report must not be used to claim, and does not imply product certification, approved, or endersoned by NY ELAP, NVLAP, NIST, or any agency of the Federal Government. All right reserved, AMA Analytical Services, Inc.

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and Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



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508722

Chain Of Custody:

BG John R. Kenly Greenbelt, MD

Job Location:

301-IH Old Bay Lane, Asm: NGB-AVN-SI,

National Guard Bureau

State Military Reservation

Job Names

Date Submitted:

9/9/2010

Person Submitting:

Date Analyzed:

W912IK6-09-A-0003

P.O. Numbers

Not Provided

Job Number

Havre de Grace, Maryland 21078

Attentions

Report Date:

9/16/2010

Page 2 of 2

Summary of Atomic Absorption Analysis for Lead

Reporting Limit

Area Wiped (ft²)

Volume (L)

7

Sample Type

Analysis Type

Client Sample

AMA Sample

Number

Comments	ly control samples p, wipe, and soil
Figal Result	See QC Summary for analytical results of quality control samples associated with those samples. NY ELAP accreditation applies only to paint chip, wipe, and soil
Total ug	See QC Summary for analytica associated with these sampes. NY ELAP accreditation applies
ii.	See QC associate NY ELAF

samples

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R:83/200(MJ-7421; Water, SM-3113B mg/l. = parts per million (ppm) Analysis Method for Plane: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-31118 mg/Kg = parts per million (ppm) on a dry weight basis NA = Not Applicable

ug/L = parts per billion (ppb) Note: All samples were received in good condition unless otherwise noted. ug = micrograms %Pb = percent lead on a dry weight basis

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Air and Wipe results are not corrected for any blank results Final results for air and wips samples are based on client strould not be considered when interpreting the result.

Note: All results have two significant digits. Any additional digits shown

change unless signed by the Technical Director or Deputy. All results are to be considered preliminary and subject to

supplied information nor verified by this laboratory.

Analyst: Lom Butruk

rechnical Manager:

G Edward Camey

heariors, and collection protection are based upon the information provided by the persons submitting them and, waters evillenced by personnel of these Laboratories, we expressly discialm any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation spinies only to polarized fight microscopy of MERA in samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AILA, NVLAP, NIST, or any agency of the Federal Government. All submitted and accepted for the exclusive use of the cheart porthom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written nutheritation from us. Sample types, rights reserved, AMA Analytical Services, Inc.

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Appendix B Photographs

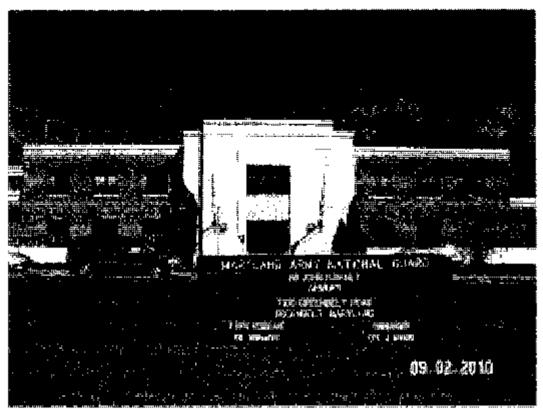


Photo 1: Exterior view



Photo 2: Damaged 9 x 9 vinyl floor tile in lounge

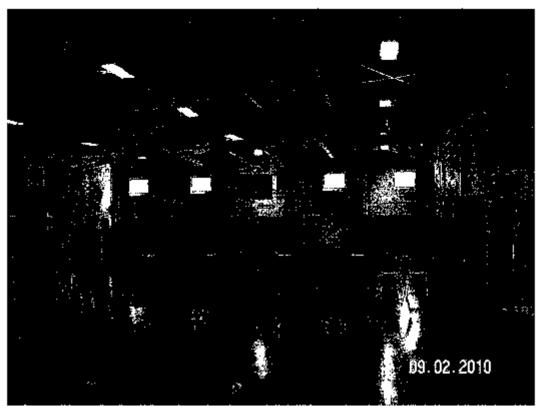


Photo 3: Drill Hall

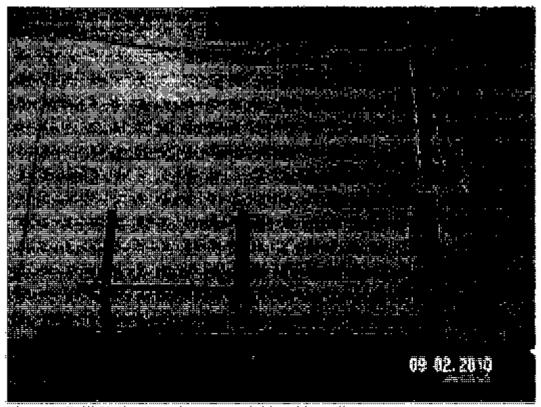
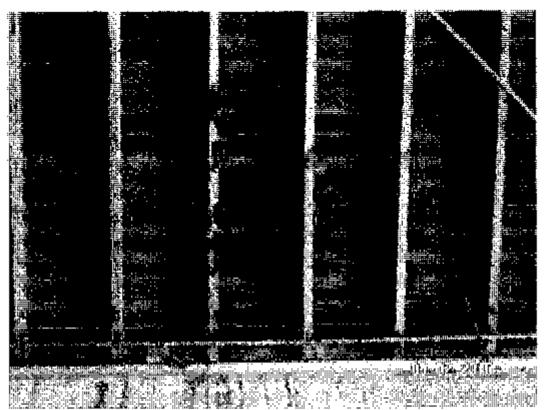


Photo 4: Drill Hall; water damage on lobby side wall



Phono 5: Grange area outside kinaber, clamage to exiling lumber

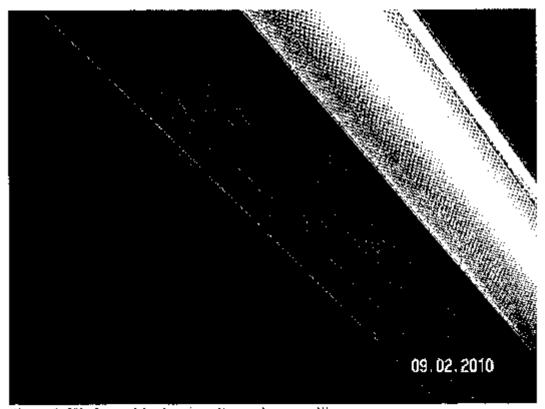


Photo 6: Kitchen; chipping / peeling paint on ceiling

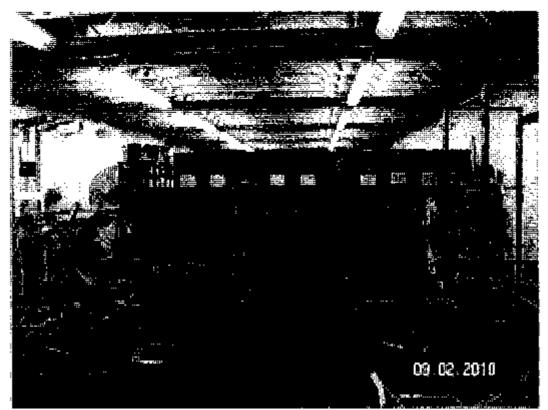
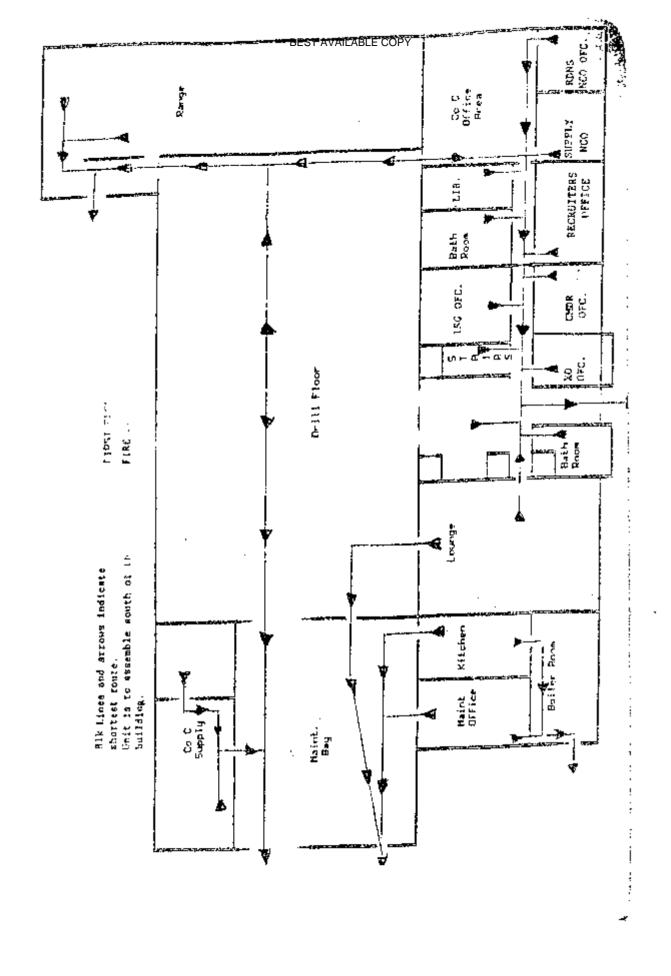


Photo 7: Converted firing range

Appendix C Floor Plan



Appendix D References

Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead
- 2. American Conference of Governmental Industrial Hygienists (ACGIII) Threshold Limit Values and Biological Exposure Indices, 2010 Edition
- Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition
- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ventilation for Acceptable Indoor Air Quality, 62.1-2007
- 5. RP-1-2004, Industrial Lighting. Illuminating Engineering Society of North America/ANSI
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227(h)(3)]
- 9. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)
- 10. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation



1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 717.590.7031 Fax: 717.590.7936

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Industrial Hygiene Survey Report

National Guard Facility Greenbelt Readiness Center

Prepared For: National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location: Greenbelt Readiness Center

7100 Greenbelt Road Greenbelt, MD 20770

Prepared By: Compliance Management International, Inc.

1215 Manor Drive

Suite 205

Mechanicsburg, PA 17055

Survey Date: May 9, 2013

Report Date: June 17, 2013



Non-Responsive

Manager, Industrial Hygiene Services

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on May 9, 2013, at the Greenbelt Readiness Center located at 7100 Greenbelt Road, Greenbelt, MD 20770. The survey was performed by Mr. Non-Responsive.

- 1. Lead surface, bulk, and air samples were collected. Surface levels of lead exceeded 200 micrograms per square foot (ug/ft²) in one location. See Section 3.0 for detailed sampling results.
- 2. Lighting levels did not meet the American National Standards Institute/Illuminating Engineering Society of North America (ANSI/IESNA) recommended guideline in one location. See Section 4.0 for detailed findings.
- 3. Indoor air quality (IAQ) parameters of temperature, relative humidity, carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment.
 - a. Temperature levels met the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 55-2010 recommended guideline of 68-79 °F in all areas sampled.
 - b. The relative humidity levels were above the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) TG 277 recommended guideline of 30-60% in all occupied areas sampled.
 - c. Carbon monoxide (CO) levels were less than the National Ambient Air Quality Standard (NAAQS) recommended ceiling of 9 ppm.
 - d. Carbon dioxide (CO₂₎ levels met the ASHRAE 62.1-2010 recommended guidelines for mechanically ventilated office buildings and commercial settings.

See Section 5.0 for detailed sampling results.

- 4. Several active roof leaks were present at the time of the survey. See Section 5.0 for detailed findings.
- 5. Water-stained ceiling tiles were observed in the facility. See Section 5.0 for detailed findings.
- 6. Several areas have asbestos containing material (ACM) floor tiles. See Section 6.0 for detailed findings.

Section 2.0 Operation Description & Observations

The Greenbelt Readiness Center is mainly an administrative facility with a drill hall, offices, classrooms, and a converted firing range area (currently wall locker storage room). There was an addition to the building in 2009. There were approximately 2 full-time employees stationed at this facility at the time of this survey.

The building is reported to have been built in 1954. It is a two-story structure. The exterior is brick and block. The interior walls are brick, block, plaster, and paneling with drywall in some of the offices. The floors are concrete, stone tile, and 9"X9" floor tiles.

The heating system consists of a gas-fired steam generating unit. There is no central A/C system; some portable A/C units are present in the facility.

There is no child-care facility in the building.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared to be properly designed. Personnel had supportive chairs.

This facility has a converted firing range that is now used to store wall lockers.

This facility has a few active roof leaks with standing water on the floor in some locations.

This facility has some areas of localized damaged 9"X9" asbestos floor tile, < 10% of the total floor tile.

Section 3.0 Lead Testing

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the American Society for Testing and Materials (ASTM) E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using Environmental Protection Agency (EPA) Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Bulk (%)	Air ug/m³	Surface ug/ft ²
1	Drill Hall	*	<5.7	*
2	Converted Firing Range/Locker Storage	*	<5.7	*
3	Drill Hall - Floor	*	*	<110
4	Drill Hall – Top of Electrical Panel	*	*	<110
5	Drill Hall – Top of Bulletin Board	*	*	490
6	Kitchen – Top of Ice Machine	*	*	<110
7	Kitchen – Top of Microwave	*	*	<110
8	1 ST Sgt. Office – Top of Book Shelf	*	*	<110
9	Recruiting Office – Top of Desk	*	*	<110
10	Hall to Converted Range - Floor	*	*	<110
11	Converted Range - Floor	*	*	<110
12	Converted Range – Top of Wall Locker	*	*	<110
13	2 nd Floor Classroom #1 – Top of TV	*	*	<110
14	2 nd Floor Office #3 – Top of Desk	*	*	<110
15	Lounge – Top of Book Shelf	*	*	<110
16	Kitchen – Ceiling Paint Chip	0.041	*	*
17	Boiler Room – Ceiling Paint Chip	< 0.0068	*	*
19	Blank - Air	*	<3	*
20	Blank - Wipe	*	*	<12
-	Criteria	0.5	50	200

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. $ug/ft^2 = micrograms per square foot$
- 4. $ug/m^3 = micrograms per cubic meter$
- 5. **ug** = micrograms

Sources:

- 1. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges
- 2. OSHA 29CFR1910.1025 Lead Standard

The National Guard Bureau currently utilizes 200 micrograms per square foot (ug/ft²) as a benchmark for identifying lead-contaminated surfaces. This guideline is referenced in NG PAM 420-15 "Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges" as a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Lead surface and air samples were collected. The following is a summary of the sample results from this survey.

- Surface levels of lead were above the recommended guideline of 200 ug/ft² in the following location: Drill Hall.
 - Cleaning procedures should be improved to maintain lead levels on surfaces below the recommended guideline of 200 ug/ft².
- Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 micrograms per cubic meter (ug/m³).
- Two paint chip samples were collected. One sample was collected from the Kitchen ceiling (approximately 40 square feet of peeling paint) and the other sample was collected from the Boiler Room ceiling (approximately 800 square feet of peeling paint). These sample results indicate that the paint chips did not contain lead greater than the recommended guideline of 0.5 %.

Section 4.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400 Precision Light Meter (Serial No. 98011EL). The light meter was last calibrated in November 2012. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles (FC)	Recommended Lighting (FC)	Sufficient Lighting
Lounge	52.8	10	Yes
Copy Room	56.1	10	Yes
1 ST Sgt. Office	70.1	30-50	Yes
Commanders Office	37.0	30-50	Yes
Recruiter's Office	58.5	30-50	Yes
Company C Office Area	57.0	30-50	Yes
NCO Office	114.1	30-50	Yes
Drill Hall	64.7	10	Yes
Cage Storage Area	30.2	5	Yes
Kitchen	37.1	50	No
Classroom One	75.5	30-50	Yes
Office One	157.3	30-50	Yes
Classroom Two	42.1	30-50	Yes
Office Three	81.6	30-50	Yes

Table Notes:

- 1. FC = Foot Candles
- 2. Bolded results did not meet listed criteria

Source: ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

The lighting level did not meet the minimum recommended guideline in the Kitchen. Lighting should be improved in these areas.

Section 5.0 Indoor Air Quality

Survey measurements were made for comfort parameters and ventilation (temperature, relative humidity, carbon dioxide, and carbon monoxide). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7575-X (Serial #1228008). The IAQ Meter was last calibrated in July 2012.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2010). ASHRAE specifies temperature ranges for human comfort (ASHRAE 55-2010). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60%.

The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
NCO Office	69.1	62.9	466	0.0
Copy Room	69.9	63.6	452	0.0
Lobby	69.4	60.8	416	0.0
Outdoors	71.1	55.8	377	0.0
Criteria	68-79	30-60	<1,077	<9

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. (%) = percent relative humidity
- 4. ${}^{\circ}\mathbf{F} = \text{degrees Fahrenheit}$

Sources: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) 55-2010, 62.1-2010, Environmental Protection Agency (EPA) National Ambient Air Quality Standard (NAAQS) & The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation.

Summary of findings and recommendations:

- Temperature measurements met the recommended 68-79°F in all occupied areas.
- Relative humidity levels were above the recommended guidelines in all sampled areas. Relative humidity should be maintained at 30-60%.
- Carbon dioxide levels were measured to evaluate building ventilation or the introduction or outdoor air into the building. The recommended ceiling is obtained by adding 700 ppm to the measured outdoor carbon dioxide level. For this survey, carbon dioxide levels did not exceed the recommended ceiling of 1,077 ppm (700 ppm + 377 ppm). This is an indication that outdoor air ventilation is adequate.
- Carbon monoxide levels measured were less than the recommended ceiling of 9 ppm. The recommended ceiling of 9 ppm referenced in the above table is the National Ambient Air Quality Standard for carbon monoxide
- A visual inspection was conducted throughout accessible portions of the facility to assess sources or pathways of factors potentially deleterious to IAQ. The following observation were noted:
 - o Active Roof leaks with standing water on the floor in the following locations;
 - 1. Converted maintenance bay
 - 2. Drill Hall
 - 3. Wall locker storage room
 - 4. Second floor office one
 - o Water-stained ceiling tiles were observed in the facility.
 - o Musty odor in the Commanders office from water damage.
 - o Water damaged building components from roof leaks.

Section 6.0 Suspect Asbestos Containing Building Materials

The following suspect ACM was noted at the time of this survey:

- 1. The facility has 9"x9" floor tiles in most rooms. Two shades of green and black, as well as white and brown floor tiles.
- 2. The following areas have localized (<10%) of the total floor tile present, damaged floors tiles and should be repaired:
 - Recruiting office
 - Lounge
 - Second floor Office one
 - Commanders Office

A bulk sample was collected from the lounge of the 9"x9" black and green floor tile and black mastic. The floor tile result was positive for asbestos (3%). The mastic result indicated a trace (< 1%) of asbestos, possibly due to associate positive from floor tile.

Inaccessible areas such as behind walls or crawlspaces were not inspected. ACM could potentially be present in these areas.

Section 7.0 Equipment

The following equipment was utilized during this survey. All sampling equipment was properly calibrated prior to use and verified for accuracy as applicable. See daily reports and calibrations logs for detailed information.

Equipment	Serial #	Calibration Date	Value
TSI QTrak IAQ Meter	1228008	7/2012	NA
Cal Light 400 Light Meter	98011EL	11/2012	NA
SKC Air Sampling Pump	647598	5/9/13	2.5 LPM
SKC Air Sampling Pump	767926	5/9/13	2.5 LPM

Section 8.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Compliance Management International, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAB #100470

Client:

National Guard Bureau

Job Name:

Maryland

Chain Of Custody:

515881

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Greenbelt RC

Date Submitted:

5/14/2013

State Military Reservation

Job Number:

Not Provided

Person Submitting:

lon-Responsiv

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Date Analyzed:

5/20/2013

5/22/2013

Report Date:

Attention:

Non-Responsive

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number	Client Sample Number			Air Volume (L)	Area Wiped (ft²)		orting imit	Total ug	Final Res	ult	Comments
13062004	1	Flame	Air	525	N/A	5.7	ug/m³	<3	<5.7	ug/m³	
13062005	2	Flame	Air	525	N/A	5.7	ug/m³	<3	<5.7	ug/m³	
13062006	3	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13062007	4	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062008	5	Flame	Wipe	****	0.108	110	ug/ft²	53	490	ug/ft²	
13062009	6	Flame	Wipe	****	0.108	110	ug/fl²	<12	<110	ug/ft²	
13062010	7	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062011	8	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13062012	9	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062013	10	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062014	11	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft2	
13062015	12	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062016	13	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062017	14	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062018	15	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13062019	16	Flame	Paint Chip	****	N/A	0.0059	%Pb		0.041	%Pb	
13062020	17	Flame	Paint Chip	****	N/A	0.0068	%Pb		< 0.0068	%Pb	
13062023	19	Flame	Air Blank	0	N/A	3	ug/m³		<3	ug	
13062024	20	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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May, 2018

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FOIA Requested Record #J-15-0085 (MD)
Released by National Guard Bureau
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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAB #100470

5/22/2013

Client:

National Guard Bureau

Job Name:

Maryland

Chain Of Custody:

515881

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Greenbelt RC

Date Submitted:

5/14/2013

State Military Reservation Havre de Grace, Maryland 21078

Job Number: P.O. Number: Not Provided

W912K6-09-A-0003

Person Submitting: Date Analyzed:

5/20/2013

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample

Client Sample

Analysis Type

Sample Type

Air Volume (L)

Area Wiped

Reporting

Total ug

associated with these

samples.

See QC Summary for analytical results of quality control samples

Comments

Report Date:

Number

Number

(ft2)

Limit

Final Result

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7000B; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7010; Water: SM-3113B

N/A = Not Applicable %Pb = percent lead on a dry weight basis

ug = micrograms

mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm) ug/L = parts per billion (ppb)

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results

Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

L. Butruk / S. Chimapad

Technical Manager:

G Edward Carney

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



Page 1 of 2

Client:

National Guard Bureau

Job Name:

Maryland

Chain Of Custody:

515881

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

State Military Reservation

Job Location:

Greenbelt RC

Date Analyzed:

5/21/2013

Havre de Grace, Maryland 21078

Job Number:

P.O. Number:

Not Provided

W912K6-09-A-0003

Person Submitting:

Attention:

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Asbestos	Mineral Wool Percent	Percent	Synthetic Percent	Particulate Percent	Sample Type	Sample Color	Homogeneity	Analyst ID	Comments
13062021	18 FT	3	3	**	**			(44)	 	 97	FT	Black	Homogeneous	SW	
13062022	18 M	TR	TR	**			100		 -	 100	MS	Black	Homogeneous		Chrysotile present i possible contamina associate positive fi FT.

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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CERTIFICATE OF ANALYSIS



Client:

National Guard Bureau

Job Name:

Maryland

Chain Of Custody:

515881

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Greenbelt RC

Date Analyzed:

5/21/2013

State Military Reservation

Job Number:

P.O. Number:

Not Provided

W912K6-09-A-0003

Person Submitting:

Attention:

Havre de Grace, Maryland 21078

Summary of Polarized Light Microscopy

Page 2 of 2

AMA Sample Number

Client Sample # Asbestos

Percent

Chrysotile Amosite Crocidolite Other Percent Percent

Asbestos

Percent Percent

Wool

Percent Percent Percent Percent

Mineral Fiberglass Organic Synthetic Other Particulate Sample

Type

Sample Homogeneity Analyst Color

Comments

ID

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- TEM RECOMMENDATION Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- MATRIX REDUCTION RECOMMENDATION Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

Uncertainty: For samples containing asbestos in range of 1-10%

the CV is 0.43, 11-35% CV=0.55, >35 CV=0.23

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Posted to NGB FOIA Reading Room.

Technical Director

Peerawut Chaikeenee

Analyst(s)

Surat Watson

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CHAIN OF CUSTODY

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Page 3400 of 5269

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AMA Analytical Services, Inc.
Focused on Results www.amalab.com
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4475 Porbes Blvd. • Lanham, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

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Appendix B. Photographs



Exterior of the facility



Drill Hall



Converted firing range/locker room



Peeling paint on the ceiling in the kitchen



Effloresces on the exterior walls of the converted maintenance bay



Standing water on the 9"X9" brown and white floor tile from an active roof leak.



Green and black 9"X9" floor tile



Recruiter's office 9"X9" damaged floor tile one of several locations



Water stained ceiling tile



Green 9"X9" floor tile



Peeling paint on ceiling and walls in the boiler room

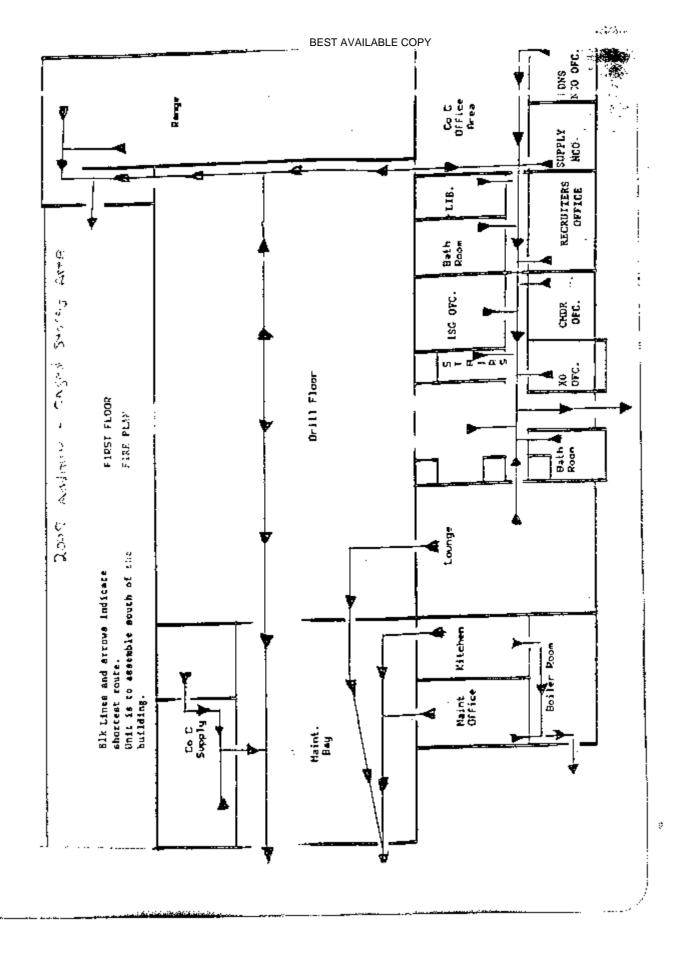


9"X9" black floor tile



Water damaged paneling from roof leak in the supply NCO office

Appendix C. Floor Plan





1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 215.699,4800 Fax: 215.699.8315

Daily Notes

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Appendix D. References

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- 2. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices, 2011 Edition.
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition.
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- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. National Ambient Air Quality Standards (NAAQS) National primary ambient air quality standards for carbon monoxide 40 CFR 50.8.
- 9. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227 (h) (3)].
- 10. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM).
- 11. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, February 2002.
- 12. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 Nov 06.
- 13. ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy, 55-2010.



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Industrial Hygiene Survey

National Guard Facility Gunpowder (Purnell) Armory 10901 Notcheliff Road Glen Arm, MD 21057-9998

Prepared For:

National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location:

Gunpowder (Purnell) Armory

10901 Notcheliff Road Glen Arm, MD 21057

Prepared By:

Analytical Laboratory Services, Inc.

3544 North Progress Avenue

Suite 100

Harrisburg, PA 17110

Survey Date:

July 23, 2010

Report Date:

August 23, 2010

ALSI Project #:

1007467

Non-Responsive

Director, Environmental Health & Safety

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Section 8.0 Maintenance Bay
Section 9.0 Limitations
Appendix A. Laboratory Analysis Report
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Section 1.0 Executive Summary

Section 1.0 Executive Summary

On July 23, 2010, Analytical Laboratory Services, Inc. (ALSI) personnel Ms. performed an industrial hygiene survey at the Gunpowder Armory located at 10901 Notchcliff Road, Glen Arm, MD 21057-9998. This is also referred to as the William C. Purnell Armory.

- 1. Surface levels of lead exceeded 200 ug/ft² in Room 126 on the supply vent. Housekeeping and cleaning should be improved to maintain lead levels below 200 ug/ft².
- 2. Lighting within the facility was evaluated. Lighting levels met the minimum recommended guidelines in all but three areas: 1) Kitchen, 2) Drill Hall. Lighting should be improved in these areas.
- 3. Indoor air quality parameters of temperature, relative humidity carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment. Relative humidity exceeded the recommended ceiling of 60% and temperature exceeded the recommended criteria of 79 degrees F in some indoor locations. There is a central air conditioning system in this building. The air-conditioning system should be inspected to determine if it is operating correctly and as designed. Relative humidity should be maintained at 30-60% whenever possible.
- 4. Some water damaged ceilings or other areas were observed. All sources of water infiltration should be identified and repaired. Water damaged ceiling and building materials should be removed and replaced.

Section 2.0 Operation Description & Observations

Section 2.0 Operation Description & Observations

The Gunpowder (Purnell) Armory serves primarily as an office setting and equipment storage facility. The facility consists of offices, a drill hall, and storage areas. There is no garage area.

The building was initially constructed in 1974. The exterior of the building is brick. The interior walls are primarily concrete block with finished drywall in some areas. The floors were composed of a poured concrete slab. The ceilings were generally composed of a roof deck with a suspended drop ceiling system in some areas.

There is a central heating, ventilating, and air conditioning system (HVAC) present. It is approximately 10 years old. At the time of this survey it was in operation but facility staff stated that it was not working properly and is often in need of maintenance. ALSI personnel inspected accessible areas of the HVAC system. No one at the facility could open the unit for our on site personnel to inspect the interior portion of the unit. The area around the roof-top unit appeared clean and well kept. Drain lines appeared to be working properly. There was no indication that reentrainment of exhaust or other contaminants was occurring. Supply and return vents were dusty and dirty in some areas.

There is an old firing range in the building. It has been fully abated. It is now used for storage and a locker room.

Overall housekeeping was fair. Floors were dirty in some areas,

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. Personnel had supportive chairs.

Section 3.0 Noise Survey

Section 3.0 Noise Survey

Employees were not performing tasks that provided excessive noise levels. Therefore, noise exposure monitoring was not conducted.

Section 4.0 Lead Testing

Section 4.0 Lcad Testing

At the time of the assessment, no activities were observed which would generate lead exposure. At one time the facility contained an indoor firing range. It is now a storage and locker room area.

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected using Ghost WipeTM samples and were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Air ug/m³	Surface ug/ft²	Paint Chip %Pb
ı	Orderly Room 127	<4		<u> </u>
2	Drill Hall	<1		<u></u>
3	Blank	<3 ug		
4	Room 126 - AC Supply Vent		150	
5	Drill Hall Return Vent		<110	I
6	Drill Hall – Floor		<110	
7	Drill Hall Top of Sada Machine		<110	Ţ
8	Kitchen - Countertop		<110	
9	Room 127B - Top of Bookshelf		<) [0]	:
10	Converted Firing Range Floor		<110	
11	Converted Firing Range - Top of Locker :	2	< 10	
l2	Converted Firing Range - Bookshelf		<110	
13	Floor Outside Converted Firing Range		<110	
14	Room 105 – Desktop		<110	
15	Room 120 Top of Locker	· ·	<110	
16	Room 117A - Supply Vent		<110	
17	Blank		<12	
Criteria	;	50	200	0.5

Key: Bolded results exceed listed criteria

Surface levels of lead exceeded 200 ug/ft2 in Room 126 on the AC Supply Vent.

The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. In the "Derivation of Wipe Surface Screening Levels for Environmental Chemicals," the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childrane facility. In such cases,

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U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³. In fact, no detectable level of lead was identified in the air samples collected.

Housekeeping and cleaning activities should be improved to maintain surface lead dust concentrations below 200 ug/Ω^2 .

Section 5.0 Lighting

Section 5.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400L Precision Light Meter (Serial No. K070003). The light meter was last calibrated on November 26, 2009. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended Lighting	Sufficient Lighting
Room 125	26.0	30-50	No
Room 127	54.6	30-50	Yes
Room 104	36.8	30-50	Yes
Room 116	83.3	30-50	Yes
Room 117	131.8	30-50	Yes
Room 114 - Kitchen	20.7	50	No
Room 101 - Drill Hali	24.4	30-50	No
Room 112	40.8	30-50	Yes
Room 105	49.2	30-50	Yes
Room 110	53.0	30-50	Yes
Room 120	40.2	30-50	Yes

Lighting levels met the minimum recommended guidelines in all but three areas: 1) Kitchen, 2) Drill Hall. Lighting should be improved in these areas.

Section 6.0 Indoor Air Quality

Section 6.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7565X (Serial # 0839020). The IAQ Meter was last calibrated in March 2010.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior of the structure ranged from 69.5 to 80.1 degrees I with relative humidity readings ranging from 48.5% to 60.8%. During the survey, carbon dioxide (CO₂) levels ranged from 442 ppm to 494 ppm within the facility compared to an outdoor CO₂ level of 410 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO₂ recommended is 1.110 ppm (410 ppm + 700 ppm). The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Room 125	70.5	55.8	460	0.0
Room 127	69.6	60.8	463	0.0
Room 104	69.5	57.9	452	0.0
Room 116	72.4	57.4	456	0.0
Room 117	71.2	60.8	443	0.0
Room 114 Kitchen	73.8	57.3	442	0.0
Room 101 - Drill Hall	76.1	54.9	470	0.0
Room 112	78.3	51.9	451	0.0
Room 105	73.8	54.8	474	0.1
Room 110	77.9	54.5	494	0.0
Room 120	80.1	48.5	469	0.0
Outdoors	90.4	63.5	410	0.0
Critería	73.0-79.0	30-60	<1,110	<9.0

Key: Bolded results exceed listed criteria

Relative humidity exceeded the recommended ceiling of 60% and temperature exceeded the recommended criteria of 79 degrees F in a few locations. There is a central air conditioning system in this building however, there are reported to be ongoing problems

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with the operation of the system including the day of this survey. Outdoor conditions were hot and humid. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- 1. The current HVAC system does not function well. It is often out of operation for maintenance.
- 2. There are ongoing roof leaks in the building. Some ceiling areas have water damage. Some ceiling tile have been removed and not replaced.
- 3. No areas of extensive microbial growth were observed. However, suspected microbial growth was present on some supply or return diffusers.

All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced. The HVAC system should be inspected to determine if it is operating correctly and as designed.

Section 7.0 Suspect Asbestos Containing Building Materials

Section 7.0 Suspect Asbestos Containing Building Materials

No suspect asbestos containing materials (ACM) were identified. Hidden or inaccessible areas were not inspected. No samples were collected.

Section 8.0 Maintenance Bay

Section 8.0 Maintenance Bay

There is no garage or maintenance area at this facility.

Section 9.0 Limitations

Section 9.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Burcau, and Analytical Laboratory Services, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A Laboratory Analysis Report



and analytical Services, Inc. A Specialized Environmental Labaratory

CERTIFICATE OF ANALYSIS

730/2010 Report Date: 7/30/201	Report	7/30/2010	Date Analyzed:	W912K6-09-A-0003	P.O. Number:		
	Non-Re		Person Submitting:	Sumpawder (Purnell) Amtory	Job Number:	Havre do Grace, Maryland 21078	
2601		7/26/2010	Date Submitted:	Olen Arm, MD	Job Location:	301-1H Old Bay Lane, Attn. NGB-AVN-SI, State Military Reservation	Address
N N		508385	Chain Of Custody:	Gunpowder (Pumoll) Armory	Job Name:	National Guard Bureau	Client
(A. 14.0)							

			·PN	
		7/30/2010	Page 1 of 2	
	Non-Re	730/2010 Report Date: 7/30/2010		
		7/30/2010		
	Person Submitting:	Date Analyzed:	alysis for Lead	•
	Chimpowcier (Purnell) Amnory	W912X6-09-A-0003	Summary of Atomic Absorption Analysis for Lead	4
	Job Number:	P.O. Number:	Summary of	•
State Military Reservation	Havre do Grace, Maryland 21078		contract the contract to the c	
			Aftention:	

AMA Sample Number	Chent Sample Number:	Analysis Type Sample Type	Sample Type	Alr Volume (L)	Area Wiped (ff)	13%	Reporting Limit	Total ug	Final Result		Comments
1064283	100767	Flame	Air	752	N/A	- nga	ug/in³.	8	4	ug/m²	
1064284	1007467-2	Maine	Air	749	N/A	4	ug/m³	♡	₹	ug/m³	
1064285	1007467-3	Plaine	Air Blank	•	N/A	स्य	ng/m³		À.	聲	
1064286	1007467-4	Flague	Wipe	***	801.0	011	119/fit 2	.91	150	ug/ff•	
1064287	1007467.5	Flame	Wipo	张寿 署基	0.108	110	"Hg/gn	<12	9 ₹	ng/ff²	
1064288	1007467-6	Planne	Wipe	※全参告:	0.108	110	ug/ñ²	<12	410	ug/ff²	
1064289	1-1297-001	Flame	Wipe	安 传	0.108	110	13/fb	×12	4110	ug/ll-	
1064290	1007467-8	Flanc	Wipe	****	801.0	110	4B/8H	<12	2110	ug/ft²	
1064291	1007467-9	Flame	Wipe	金龙	0.108	110	117/III	715	Ø10	ug/ff?	
1064292	1007467-10	Flaine	Wipe	****	301.0	110	ug/ft²	<u>7</u>	017×	all/fin	
1064293	1007467-11	Flanc	Wipe	****	991.0	110	48/B*	<12	×110	ug/ff	
1064294	1007467-12	Flame	Wipe	华王为外	901.0	110	ugAF	<12	₩ ₩	ug/ff²	
1064295	1007467-13	Flame	Wipe	**	0.108	110	ug/A	<12	0.L1∆	ug/ft²	
1064296	1007467-14	Flame	Wipe	****	901.0	011	मह्य	Ç	010	ng/ff²	
1064297	1007467-15	Flame	Wipe	李本本李	0.108	110	ug/fit	<12	<110	116/16	
1064298	1007467-16	Flanse	Wipe	***	0.108	110	ug/ff².	Ç	<130	ug/ft*	
1064299	1007467-17	Plaine	Wipe Blank	香食香味	N/A	12	bi pi		₹	£	

This report applies only to five simples, investigated and is not necessarily indicative of the quality or candition of apparently identical or similar products. As a mutual protection to elecits, the public, and those Laboratories are described and now advertising or publicity matter without prince written anthorization from us. Sample types, locations, and second in a persons submitting than and, and second in a persons submitting than and, and second in a person submitting than and, and second in a person submitting than and, and second in a person submitting than and second and appropriate of the second in a person submitting than and second in a person submitted in a person of the second in a person of the

4475 Forbes Thed. - Lanban, N.D. 20706 · (301) 459-2640 · Toll Pres (800) 346-9961 · Fex (301) 459-2543 An ARIA (#186478), NVI.AP (101143-9), and NY ELAP (#18928) Accredited Laboratory

and analytical services, inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



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508385

Chain Of Custody;

Gunpowder (Purnell) Armory

Glen Arm, MD

fob Lorafion:

301-IF Old Bay Lane, Atta: NGB-AVN-SI,

National Quand Bureau

State Military Reservation

Havre de Grace, Maryland 21078

Attention:

Job Name:

Gurpowder (Paraell) Armory

W912K6-69-A-0003

P.O. Number: Jeb Numbers

Date Submitted:

7/30/2010

Report Date:

7/26/2010

7/30/2010

Person Submittings Date Analyzed:

Page 2 of 2

Comments

Final Result

Total ng

Reporting Limit

Area Wiped
(ff)

Summary of Atomic Absorption Analysis for Lead

Air Volume	3
Sample Type	
Analysis Type Sample Type	
Cient Sample	Number

AMIA Sample

Number

Analysis Method for Flamer Air, Wipes, Paints, and Soli/Solids: EPA 600/R-93/200(M): 7420; Water, SM-3111B

See QC Summary for analytical results of quality control samples associated with these sampes. NY ELAP accreditation applies only to paint chip, wipe, and soft Analysis Method For Furnace: Air, Wilpes, Paints, and Soli/Solids: EPA 600/R-93/2004M)-7421; Water: SM-3113B

samples.

mg/L = parts per million (ppm) ug/L = parts per hillion (ppb) mg/Kg = parts per million (rpm) on a dry weight basis ug = micrograms

Note: All samples were received in good condition unless otherwise noted. %Pb = percent lead on a dry weight basis

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results Final results for air and wipe samples are based on olient supplied information nor verified by this laboratory.

All results are to be considered prefirminary and subject to change unless signed by the Technical Director or Deputy.

Analyst. Nich McGarrey

Technical Manager:

G Betward Camey

becations, and collection protocols are based upon the information provided by the persons submitting them and, unices collected by personned of these Laboratories, we expressly disclutin any knowledge and including for the accuracy and completeness of this internation. Residind simple material will be discorded in secondance with the appropriate requested by the client. NVLAP accreditation applies only to polarized light microscopy of MIERA will secondance with the report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, NVLAP, WIST, or any agency of the Foderial Government All submitted and accepted for the exclusive as 60 the client to whom II is addressed and upon the condition that it is not to be used.

411 ATHA WIDDITO, NYLAP (IDIIA), and NY ELAP (MIO)201 Accoulted Laboratory

4475 Purbes BNd. · Lumham, MLD, 20706 · (591) 459, 2648 · Toll Free (890) 346-0961 · Fax (591) 459-2643

Addresss Client:

N/A = Not Applicable

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(Q1) with Report 1 Carl Lake Coor 1@us. army. mil (VIII) 50 Š 3 Initials 210 REV. 6.08 (QTY) CLAS. (LABORATORY STAIN ONLY) SUTTY OAS J Culturally 10 Species (Medic D Surface Vicality Dust J Cyliniade IB Genes (Mede inc# (410) 942-0273 @us.army.mi CLIENT CONTACT Contact Contact Constact: Collection Apparatus for Spore Traps Air Salaptes: REPORT TO: Job # Sunoanter (Punel) Puneyo # Watzka 08-A-1003 O Ph Paint Chip

X Ph Data Wipe (w.jpe fyinc; Data S.C.)

X Ph Air S.C. (17%)

O Ph Suit Solid

O Ph TY P O Pr. CCLP.

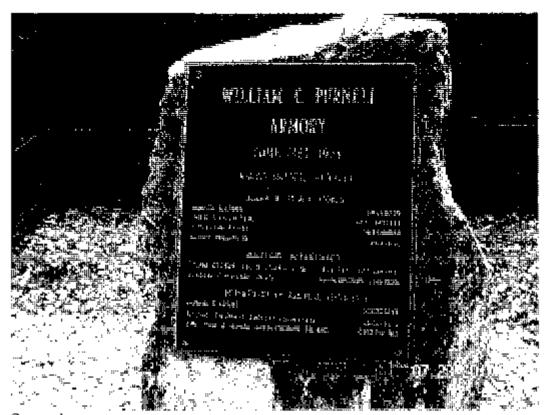
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O Wester Water O Ph. (CTY) J.C. Sign (Plouse Roller To This Number For Inquires) Time. 156202 - (OT'S) (CLE) (0.1%) COLO Date/Thite: Date/Times Dale/Time: Summitual Information: attire O Pb Furnace (Medita Collection Media U Spure-Trap HWAS S Inches C Starface 15p. 1 OffertSpelly Metals Analysis fungot Analysis ag tu Job Location: Eller Arms, M.D. release Packey (#10) 942-0254 5. Submitted by Reporting Information (Results will be provided as soon as technically STATE I C Results Required By Noon (Every Agenty) Will De Mace to Accommiste) CHAIN OF CUSTODY All samples received in good condition unless officewise noted, Date By Orange () (CTO) YTHE (CTV) 111 NORMAL RUSINESS ROURS Contact Pers 03V1(4)T0F2.U-2024 3 (CITY) $g_{\gamma_{OV_{V}}}$ 1764 Ensi D. Qual, (presides) VacentuBusi U. Quae, (states) Vacium Dr755-95. D. Quen, (states) flust De480-99. (QTY) KOTTO: Byres degr. ANALYSIS S Vie TEM Both O BLAP 198-AChaffeld O NY State PLINTEM O Resideal Ash ly 7 O Gool, (presiden) O S Day μ_{λ} ٥ 0 CI EPA MALI WAI Fux # (410) 942-0254 TEM Water 1000 P Auth NGB-AVN-St, State Millery Reservation Commediate
Convex Day 3 VOLUME VIHA (#100479) NVLAP (#101,143-0) NY ELAP (10920) 000 ٦. (3) 148.8 (30 P. 459-2640 • (800) 346-4961 • (10x (301) 459-2643 Address 3: Havre de Grace, Maryland 21078 3 (YT9) 10173 Tried Row Browshift 2. Date/Time Analyzed: 3. Results Reported Tor. (C) Y AMA Analytical Services, Inc. SAMPLE INFORMATION L. Date/Tune RCVD: 1475 Forthes Blvd. • Linham, MD 20706 (OLX) Orderly Roll37 dingkang locks Irah Hall Reduch The Men Counter AN LOTIN POSITAL iningland Floring hall Hall Floor will then seath. Clear Names National Guard Bureau SAMPLE LOCATION
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TEM Air - Pieuse Indicate Filter Type:
Ci Autura A. SKILK U Grav. Reduction. DL.A.P. 198.6. U.M. Bulk. C) El-A (20) - Visual Listamoto. Mailing Billing Information: CL NY State Priable 198.1 Date Duc. Time Due: LABORATORY CELL ROOM CHURC 007467-ID STAFFONLY SOLUTION CO 8-18-1-80 C) Other typecify, S-1-95-1-155 Cliber (specify, 0-19X-8 77-1387-1337 8-13718 9718 Asbestos Amelysis イラブら CINCH SOIN C CLIENT ID NUMBER (CUSTODY) Address 2: MPSC C) Vermiculise -13H100 Clanactate C 24 Flours Comments 42

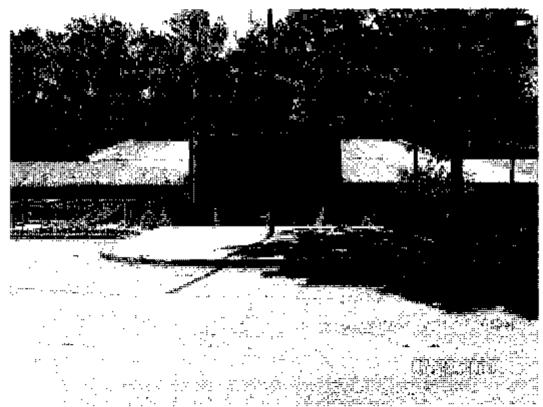
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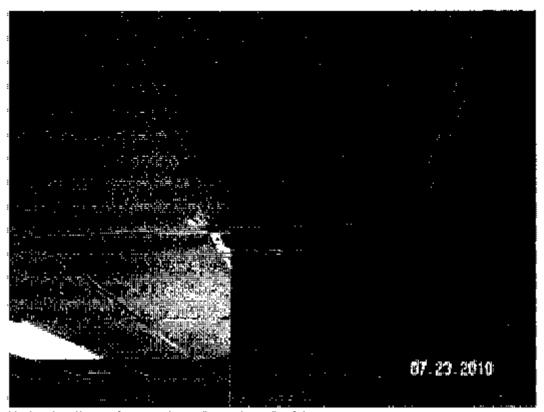
Appendix B Photographs



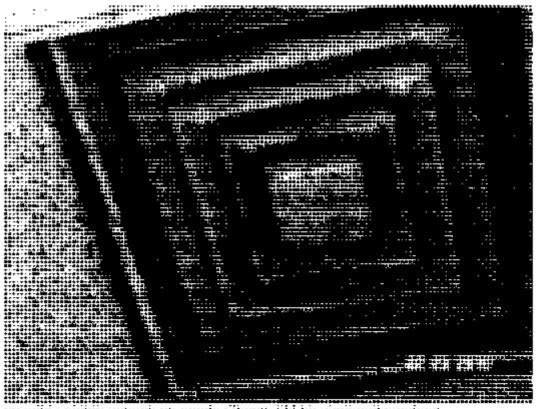
Stone plaque



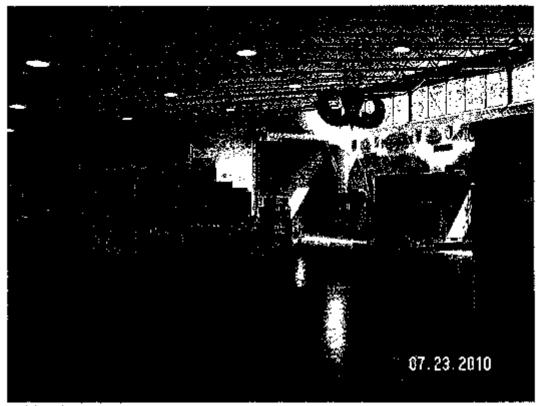
Front of building, exterior



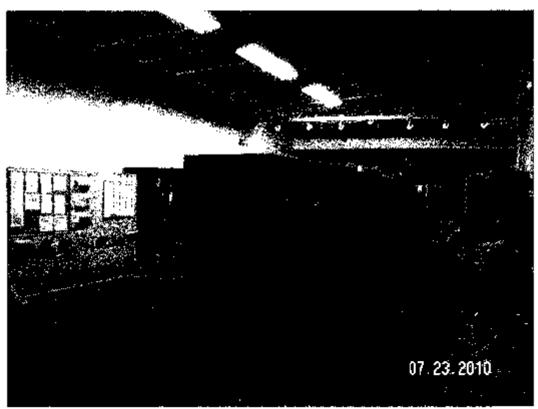
Stained colling tales, emform throughout holiding



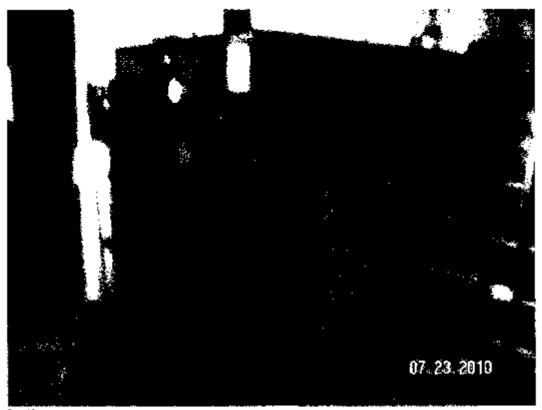
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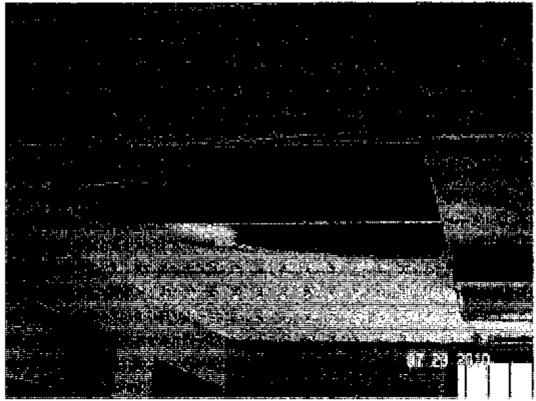
Drill Hall



Converted firing range



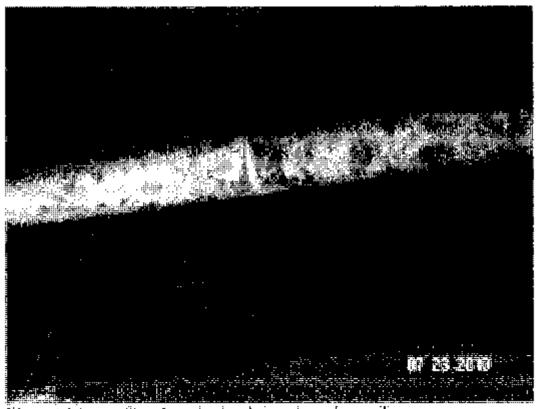
Boiler



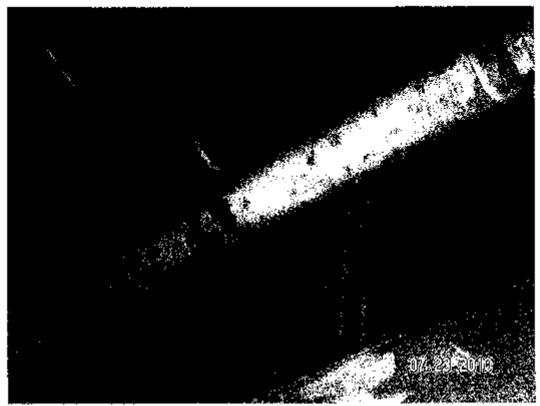
Broken / missing / stained ceiling tile (Room 117A), similar throughout



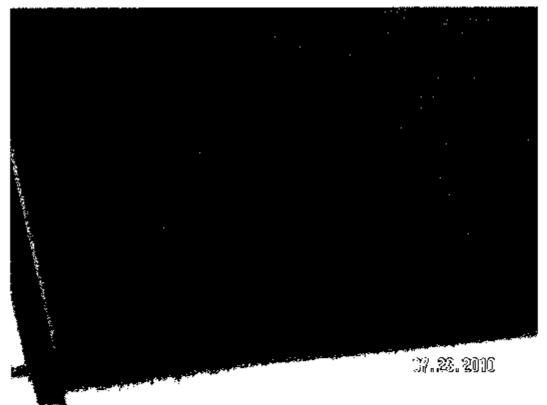
Heating Unit



Water staining on fifterpiess pipe insulation above drop ceiling



Water staining on fiberglass pipe insulation above drop ceiling



Water staining of roof deek above drop ceiling

Appendix C Floor Plans

Appendix C. Floor Plan

Floor Plan not available.

Appendix D References

Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices, 2010 Edition
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 25th Edition
- 4. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ventilation for Acceptable Indoor Air Quality, 62.1-2007
- 5. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Thermal Environmental Conditions for Human Occupancy, 55-2004
- 6. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 7. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 8. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 9. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745,227(h)(3)]
- 10. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)
- 11. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation



DEPARTMENT OF THE ARMY US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS May 2004

MEMORANDUM FOR Army National Guard Bureau (NGB) Region North Industrial Hygiene NGB-AVS-SI-IH/Non-Responsive, 301-IH Old Bay Lane, Havre de Grace, MD 21078

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Project No. 55-ML-01ED-03 Brig. Gen (MD) Randolph Millholland Armory, Hagerstown, MD

- 1. Enclosed is a copy of subject report and one CD-ROM.
- 2. Please direct any additional comments or concerns to Ms. Non-Responsive at DSN 584-5475/3118, commercial (410) 436-5475/3118 or e-mail address at Non-Responsive (@apg.amedd.army.mil.

ENCL



Industrial Hygienist Industrial Hygiene Field Services Program



U.S. Army Center for Health Promotion and Preventive Medicine







MDARNG FACILITIES IH BASELINE SURVEY BG RANDOLPH MILLHOLLAND ARMORY HAGERSTOWN, MD 55-ML-01ED-03











Approved for public release; distribution unlimited.

Readiness Thru Health

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World War II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed \$3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/ supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- ♦ Integrity is the foundation
- ♦ Excellence is the standard
- Customer satisfaction is the focus
- ♦ Its people are the most valued resource
- ◆ Continuous quality improvement is its pathway

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army Imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization fiercely proud of its history, yet equally excited about the future. It is destined to continue its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.



DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD **ABERDEEN PROVING GROUND MD 21010-5403**

EXECUTIVE SUMMARY MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS, BRIG. GEN (MD) RANDOLPH MILLHOLLAND ARMORY HAGERSTOWN, MD PROJECT NO. 55-ML-01ED-03

1. PURPOSE OF EVALUATION. To conduct surveys at Army National Guard (ARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions at ARNG facilities. The survey will serve to establish a baseline so that a worker's history of exposures is provided for each civilian or military employee.

2. CONCLUSIONS.

- a. Lead. All air samples are below the laboratory analytical detection limit for lead in air of 0.004 mg/m³ and 0.006 mg/m³. Two surface dust-lead samples in the storage area (old firing range area) exceeded the USACHPPM recommended decontamination levels. These elevated levels of dust-lead exist on surfaces frequently contacted by the general workforce. Workers involved in renovation and abatement activities may be occupationally exposed to lead. There is a significant health risk to children from lead in surface dust in the storage room (old firing range) area.
 - b. Ventilation. The old and new central HVAC systems are not well balanced.

3. RECOMMENDATIONS.

The Department of Defense Risk Assessment Codes (RAC) for Health Hazards enables one to prioritize remedial action for hazards. Risk Assessments Codes range in magnitude from 1 to 5, with 1 being the highest priority.

a. Lead. The RAC for this armory for Lead Exposure is classified as 4. To minimize lead exposure, clean all of the storage area (areas of the old firing range) where sampling results showed elevated levels of lead. Comprehensive guidelines for cleaning are in Appendix F. Consult with the Maryland Armory Environmental Coordinator concerning waste disposal requirements after cleanup. There is a risk of contaminating items stored in the storage room with lead dust. Do not store medical, food or clothing items in this area until the area has been decontaminated. A potential occupational exposure to lead has been identified for workers involved in renovation and abatement activities. These workers are required to be in compliance with the OSHA lead in construction standard 29 CFR 1926.62. There is a potential for personnel

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May, 2018

taking lead contamination out of the workplace into their vehicles and homes. Wear disposable gloves and disposable coveralls as extra protection when working in areas identified as having elevated levels of lead. Test drinking water from water fountains and faucets for lead. Address all potential lead hazards before extending this facility to use for children.

b. Ventilation. A mechanical engineer should review the design of the HVAC systems.

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

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6.	SAMPLING RESULTS	2
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DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Project No. 55-ML-01ED-03

LOCATION: Brig. Gen (MD) Randolph Millholland Armory, Hagerstown, MD

- 1. AUTHORITY. E-Mail dated 28 February 2003 from Ms Non-Responsive, Industrial Hygienist, MD Army National Guard, to the USACHPPM Industrial Hygiene Field Services Program
- 2. PURPOSE OF EVALUATION. To conduct surveys at Army National Guard (ARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions at ARNG facilities. The survey will serve to establish a baseline so that a worker's history of exposures is provided for each civilian or military employee.
- 3. BACKGROUND INFORMATION.
- a. Armory Mission. 729th Support Battalion (FSB) and Organizational Maintenance Shop#7A. Forward Support Battalion, supply and maintenance, logistics.
- b. Date of Construction. The original building was built in 1979. One half of the building was renovated in 1997.
 - c. POC. SFC Non-Responsive 301-791-4028.
 - d. Survey Date: 12 August 2003.
- 4. SUMMARY OF ACTIONS.
- a. Sampling. Surface wipe, air and bulk samples were collected to determine the existence of lead-based paint and/or lead-based paint hazards (paint-lead hazards). Sample locations are in Appendix D.
- b. Physical Condition of Facilities.

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

- (1) Paint. The paint was in good condition. The old section of the building has all new tile and new paint on the walls.
- (2) Asbestos. Staff Sergeant Non-Responsive, Environmental Compliance Assessment Coordinator for the MD NGB, stated that all asbestos had been abated.
- (3) Mold. SCF stated that there have been no problems with mold. The roof had leaked in the drill area at one time but the roof was fixed.
- (4) Safety Hazards. No safety hazards were observed.
- c. Safety and Industrial Hygiene Programs. There are no written program records at the armory.
- d. Heating, Ventilation, and Air-conditioning System. Both the original and renovated areas of the building have their own HVAC systems. The original and new central HVAC systems are not well balanced.
 - e. Noise Dosimetry. No operation that could produce hazardous noise levels was identified.
- f. Lighting. All areas appeared to be adequately lit and occupants reported no areas of deficient lighting. No measurements were collected.
- g. Converted indoor firing range (IFR). Staff Sergeant Non-Responsive stated that lead in the converted indoor firing range was not abated during its conversion. It is now being used as a storage area.
 - h. Photographs. (Appendix C).
 - i. Site Maps. (Appendix B).

Posted to NGB FOIA Reading Room

May, 2018

- j. Facility use by children. This armory is periodically rented for youth sports, family support groups, and public activities.
- 5. ASSESSMENT CRITERIA FOR LEAD. (Appendix A).
- 6. SAMPLING RESULTS. Lead in air and surface wipe sample results are in Appendix D. All air sample results were below the laboratory analytical detection limits of 0.004mg/m³ and 0.006mg/m³ lead in air. Two of 15 surface wipes exceeded the USACHPPM

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

recommended decontamination level of $200 \,\mu\text{g/ft}^2$ for floors and other frequently-contacted surfaces. (photo #s 1472 and 1474). These two wipe samples exceeded the EPA lead exposure levels for children under 6.

7. DISCUSSION. Both surface wipe samples exceeding USACHPPM decontamination guidance were collected in the area of the converted indoor firing range. One was collected on the floor near the old IFR, which has been renovated as a storage room (1472). The other was from the floor where the IFR baffle used to be (1474). These wipe samples exceeded the EPA lead exposure levels for children. EPA regulations define dust-lead standards for young children in child-occupied facilities. The EPA standard for dust-lead on floors is 40 µg/ft², and 100 µg/ft² for dust-lead on window sills. These levels were developed for children under 6 spending at least 60 hours per year in pre-1978 facilities. Two surface dust-lead samples collected in this armory greatly exceeded these standards. Although this armory does not meet the EPA definition of child-occupied facility's minimum time requirement for child use, USACHPPM believes that there is a potential hazard for children using this facility. AR 420-70 states that the purpose of Army lead hazard management is to protect children from all sources of lead exposure. However, its provisions only control these exposures, and do not eliminate them. Although this facility may comply with EPA and Army regulations, exposures for children under 6 may exceed those that the regulations are intended to prevent.

8. CONCLUSIONS.

- a. All air samples are below the laboratory analytical detection limit for lead in air of 0.004 mg/m³ and 0.006 mg/m³.
- b. Two surface dust-lead samples in the old IFR area exceeded the USACHPPM recommended decontamination levels. These elevated levels of dust-lead exist on surfaces frequently contacted by the general workforce.
- c. Workers involved in renovation and abatement activities may be occupationally exposed to lead.
- d. There is a significant health risk to children from lead in surface dust in the old firing range (storage) area.
 - e. There is a risk of contaminating items stored in the storage room with lead dust.
 - f. The old and new central HVAC systems are not well balanced.

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

9. RECOMMENDATIONS. Enclosure.

10. ADDITIONAL ASSISTANCE. For additional assistance, or questions concerning this report, please contact the undersigned at DSN 584-3118, commercial 410-436-3118, or by e-mail Non-Responsive apg. amedd.army.mil.

Non-Responsive

INDUSTRIAL HYGIENIST
USACHPPM LEAD AND ASBESTOS TEAM LEADER
Industrial Hygiene Field Services Program
EPA AHERA Asbestos Inspector and Management Planner/
Certification Number MD-070340
EPA Lead Inspector and Lead Risk Assessor/
Certification Number 04-7913

Posted to NGB FOIA Reading Room

May, 2018

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

ENCLOSURE

HAGERSTOWN ARMORY RECOMMENDATIONS

The Department of Defense Instruction Number (DODI) 6055.1 provides Risk Assessment Codes (RAC) for Health Hazards, a procedure which allows us to assess the magnitude of exposure to physical, chemical, and biological agents and the possible medical effects of exposure. The RAC is an expression of the risk associated with the hazard and combines the hazard severity and accident probability into a single numeral. RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority. The RAC for this armory for Lead Exposure is classified as 4.

- a. Clean all areas in the storage room (old renovated indoor firing range) area where sampling results showed elevated levels of lead. Comprehensive guidelines for cleaning are in Appendix F. Consult with the Maryland Armory Environmental Coordinator concerning waste disposal requirements after cleanup.
- b. There is a risk of contaminating items stored in the storage room with lead dust. Do not store medical, food or clothing in this area until the area has been decontaminated.
- c. A potential occupational exposure to lead has been identified for workers involved in renovation and abatement activities. These workers are required to be in compliance with the OSHA lead in construction standard 29 CFR 1926.62.
- d. There is a potential for personnel taking lead contamination out of the workplace into their vehicles and homes. Wear disposable gloves and disposable coveralls as extra protection when working in areas identified as having elevated levels of lead.
- e. Test drinking water from water fountains and faucets for lead. It could not be determined if this has been done.
 - f. Address all potential lead hazards before extending this facility to use for children.
 - g. A mechanical engineer should review the design of the HVAC systems.

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

APPENDIX A

ASSESSMENT CRITERIA FOR LEAD

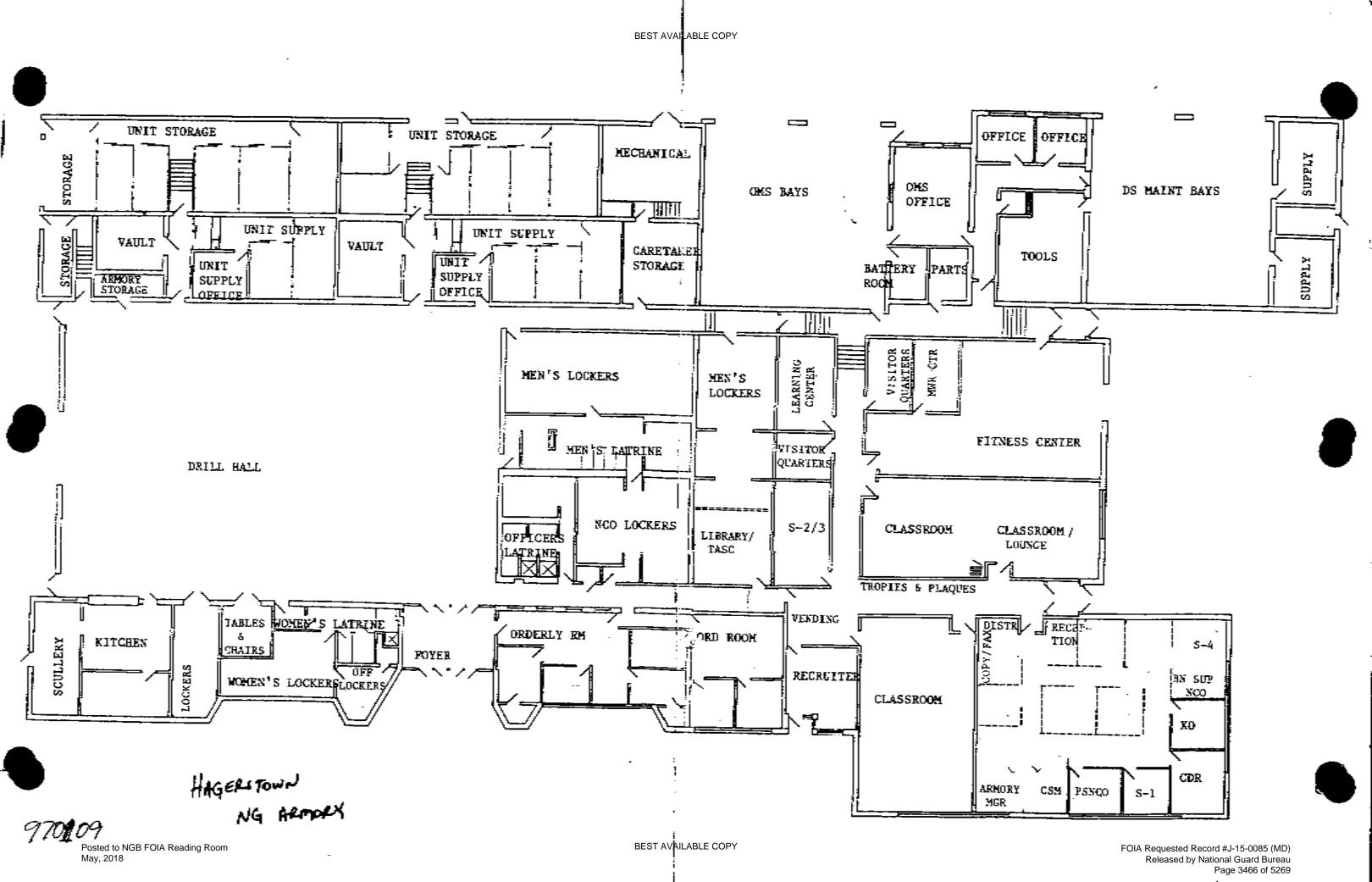
Subject: Proposed Recommendations for Surface Lead in Armories

- 1. In armories that do not contain childcare facilities, the NGB Region North Industrial Hygiene Office recommends cleaning the areas in which sample results are greater than $200 \,\mu\text{g/ft}^2$. This guidance is based on professional judgment, risk assessments, adaptation of OSHA guidance, and feasibility of cleaning to a certain level.
- a. EPA standards (40 CFR 745.227(e)(8)(viii))are not directly applicable because they are developed for floors (40 μ g/ft²), windowsills (250 μ g/ft²) and window troughs (400 μ g/ft²) in residential and childcare facilities. Most of the wipe samples in armories were collected in undisturbed areas and therefore, results are worst case scenarios and do not correlate to these standards.
- b. OSHA has no specific requirement for work area surfaces. The lead standard (29 CFR 1910.1025(h)) states that all surfaces shall be maintained as free as practicable of accumulations of lead. In workplaces where lead is generated, surface levels may be much higher, but personnel exposures can be controlled by limiting airborne lead levels and following good cleanup and hygienic practices.
- c. OSHA used to cite a level of 200 μ g/ft² in their Technical Manual and 29 CFR 1926.62 as guidance to its own inspectors for evaluating the cleanliness of lunchroom and locker room surfaces that are supposed to be kept as clean as possible.
- d. In a report titled Derivation of Wipe Surface Screening Levels for Environmental Chemicals, USACHPPM has determined that $200~\mu g/ft^2$ is a safe surface contamination level. They have also applied these standards as the decontamination levels for surfaces in administrative offices.
- e. It should be noted that levels above these recommendations do not necessarily mean there is a significant hazard to workers who are following good cleaning and hygienic practices since there is no correlation between wipe and air samples. Rather, we recommend these levels as a precautionary measure.
- 2. The NGB Occupational Health Branch is developing guidance for armories that are used as childcare facilities. All states will receive this guidance when it is completed.
- 3. Ambient air samples collected in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m³ averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead in this building.

MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

APPENDIX B

SITE MAPS

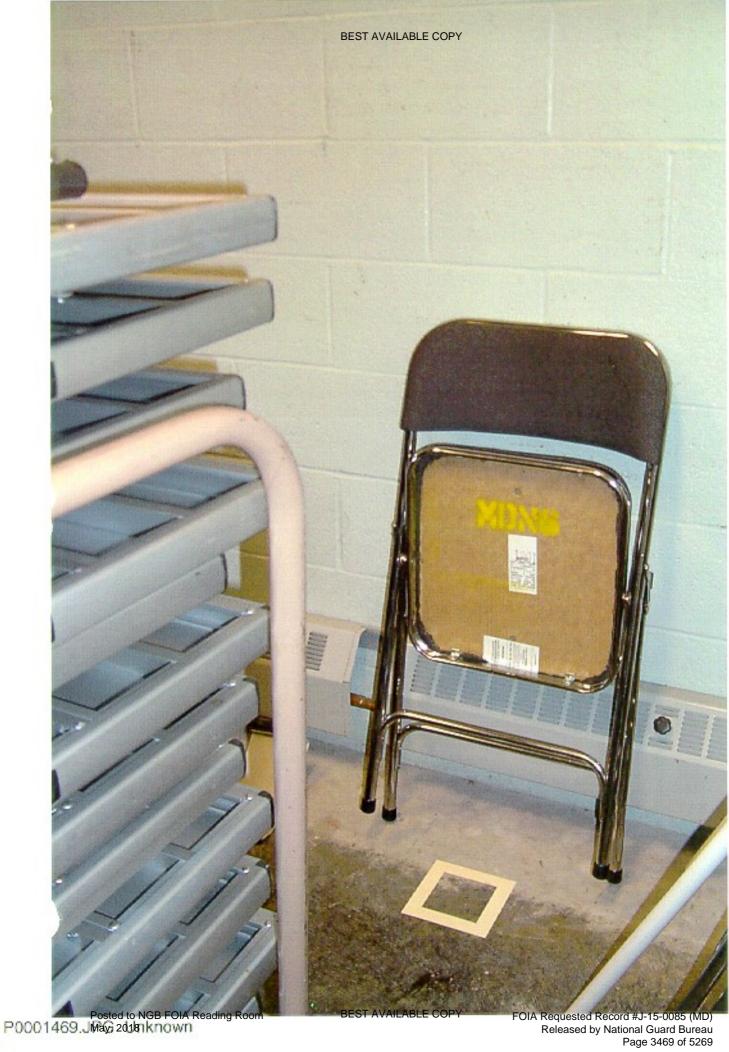


MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

APPENDIX C

PHOTOGRAPHS

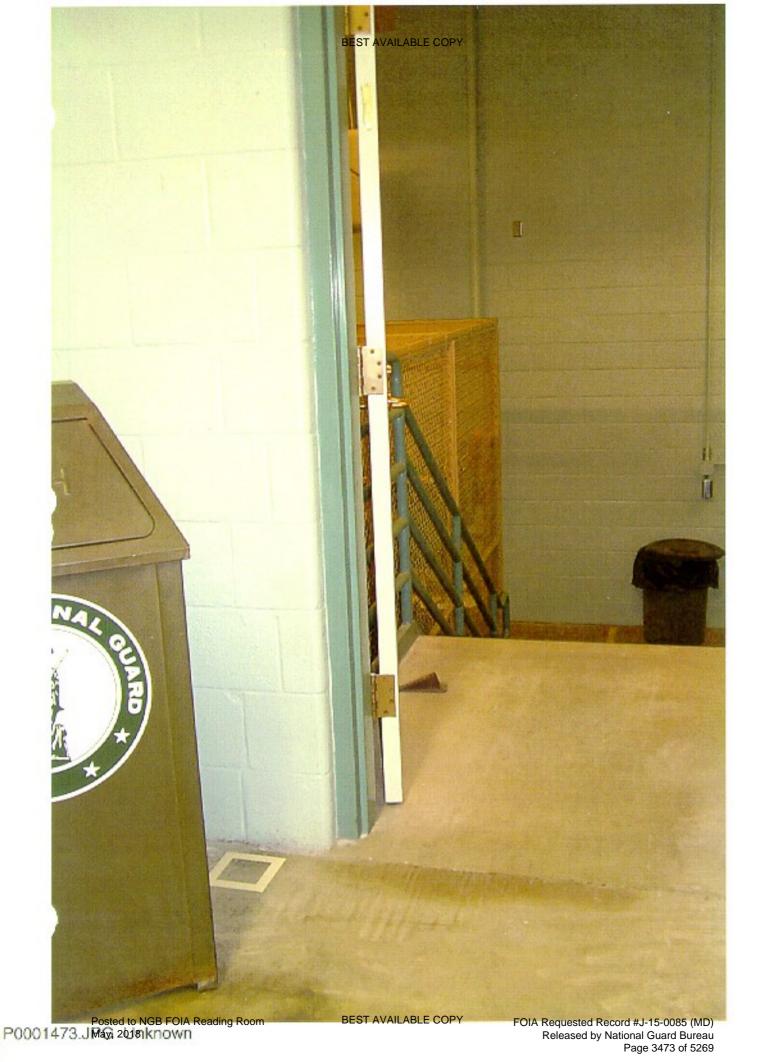
Photo Number	Photo Location
1469	Supply room for tables and chairs
1470	Kitchen supply room (refrigerators)
1471	Kitchen preparation counter
1472	Storage room- near front of former IFR
1473	Floor outside door of former IFR
1474	Floor near former baffle of IFR
1475	Room 113 floor
1476	Drill area floor near kitchen
1477	Wall near 123 in drill area
1478	Floor at bottom of steps to food storage area near room 123
1479	Mold on tile in same area as food storage
1480	Lobby area table
1481	HQ office (729 th) top of cabinets

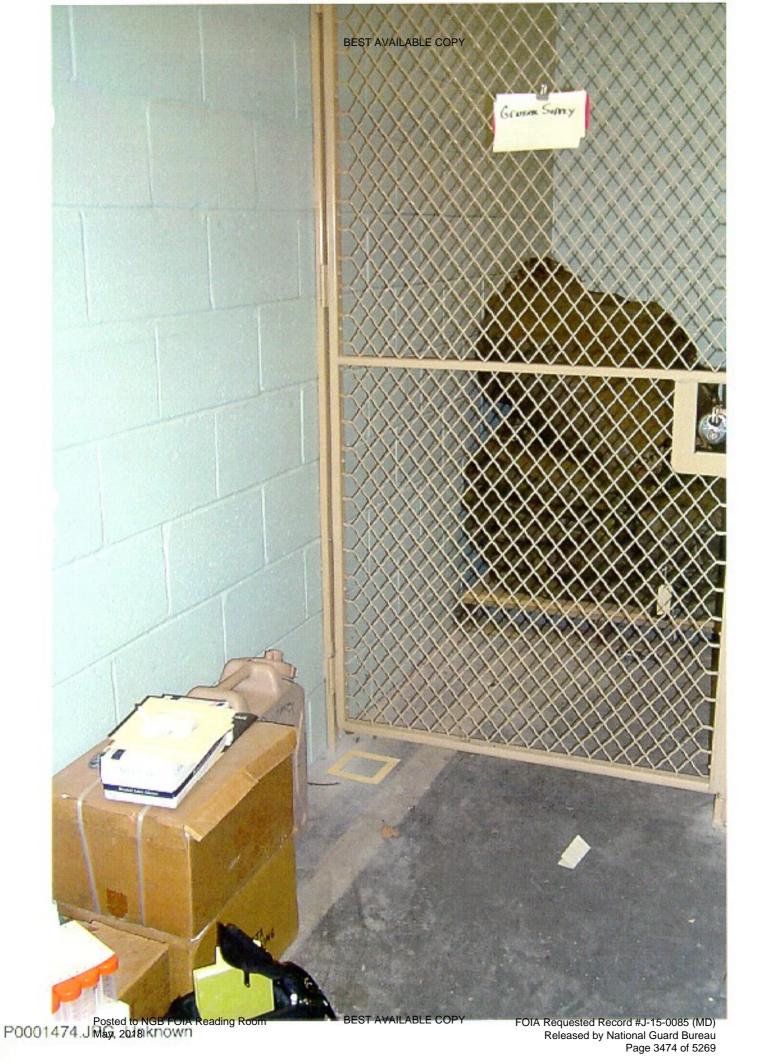








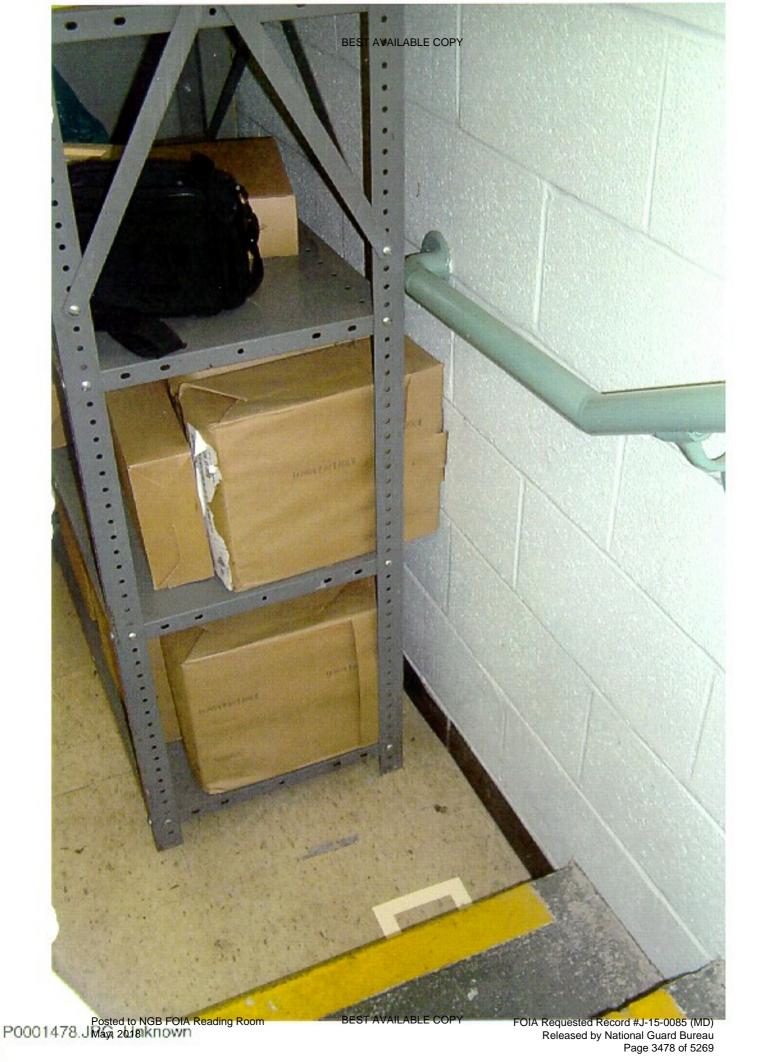




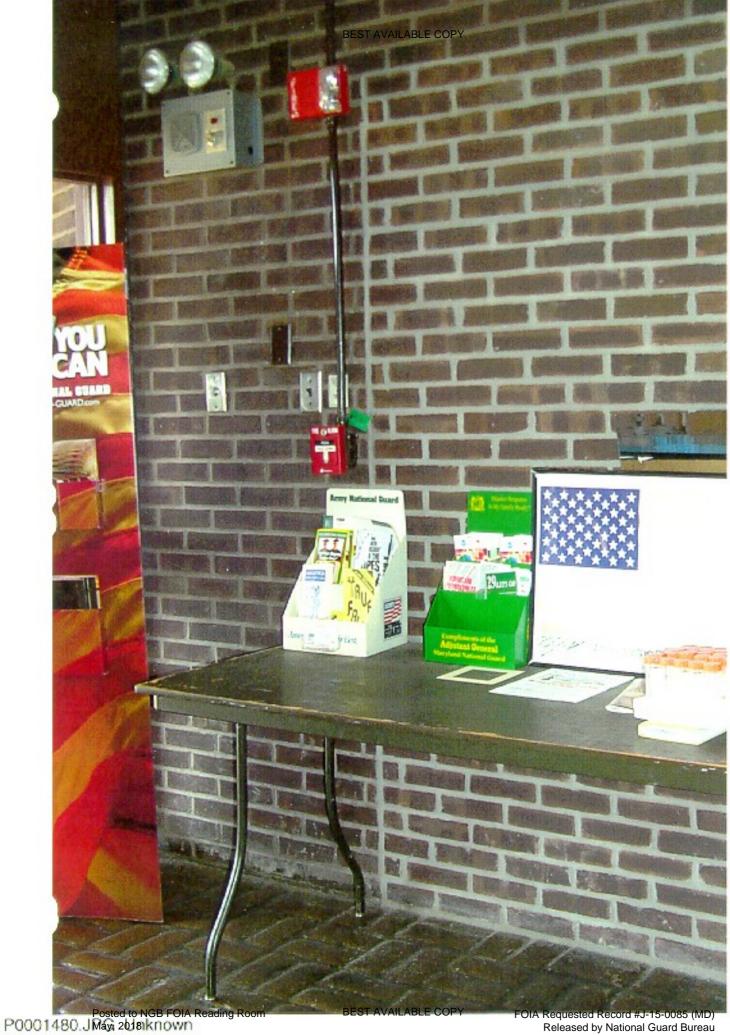








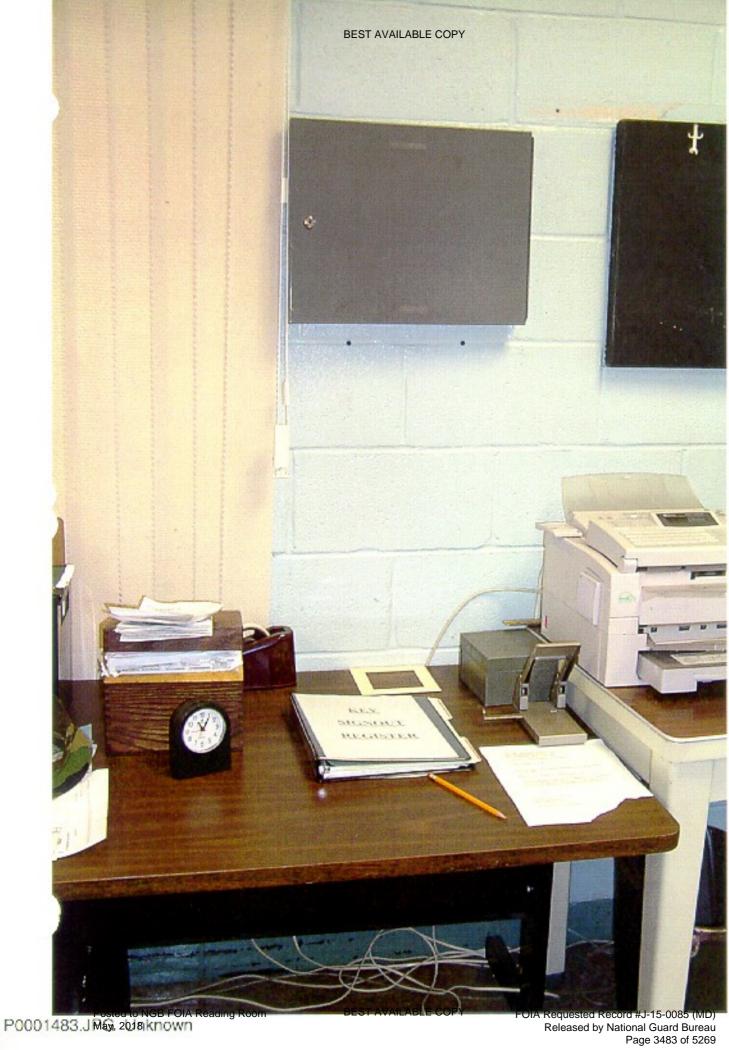




FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 3480 of 5269













MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

APPENDIX D

SAMPLING SHEETS AND LAB ANALYSES

				Indoor Ra	inge li	nto	1	
Wipe Sample #	Armory	City	Active	Inactive	N/A	Cieaned?	Location of Samples	Conc. (µg/ft³)
HGW01	Hagerstown	Hagerstown		Yes		Unknown	Floor of Room 107 Supply Room	BDL
HGW02	Hagerstown	Hagerstown				[Floor Kitchen Supply Room (Refrig)	BDL
HGW03	Hagerstown	Hagerslown					Preparation Counter in Kitchen	BDL
HGW04	Hagerstown	Hagerstown					Floor in front of former IFR	232
HGW05	Hagerstown	Hagerstown					Floor outside door to former IFR	BDL
HGW06	Hagerstown	Hagerstown					Floor near where baffle used to be	2545
HGW07	Hagerstown	Hagerstown					Floor in Room 113	BDL
HGW08	Hagerstown	Hagerstown					Drill area floor near kitchen	BDL
HGW09	Hagerstown	Hagerstown					Wall near 123 in drill area	BDL
HGW10	Hagerslown	Hagerstown					Floor at bottom of steps to food dtorage area (Room 123	24
HGW11	Hagerstown	Hagerstown					Table in lobby area	BDL
HGW12	Hagerstown	Hagerstown					Top of cabinets in HQ office (729th)	BDL
HGW13	Hagerstown	Hagerstown					Floor unde windows in OMS office	BDL
HGW14	Hagerstown	Hagerstown					Desktop in OMS office	BDL
HGW15	Hagerstown	Hagerstown					Top of desktop cabinet in office on new side of OMS	BDL



Submitted To:

Non-Responsive

Commander, USACHPPM

5158 Blackhawk Road, Attn: MCHB-TS-OFS

APG, MD 21010-5403

Reference Data:

Lead

Client Sample No.:

HGAS01 through HGBlank03

P.O. No.:

Not Available

Sample Location:

Hagerstown NG Armory

Sample Type:

Filter

Method Reference: DCL Set ID No.:

NIOSH 7300

DCL Sample ID No.:

03-S-4147 03-25415 through 03-25421

Sample Receipt Date:

8/27/2003

Preparation Date:

08/27/03 08/27/03

Analysis Date:

The samples were prepared and analyzed in accordance with NIOSH method 7300 using a Perkin Elmer 3000XL ICP.

The sample condition upon receipt was acceptable except where noted.

The results are in the enclosed data table. Results relate only to the items tested and are not blank corrected unless indicated in the data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.



Reviewet/

CINCINNATI OFFICE 4388 GLENDALE-MILFORD ROAD CINCINNATI, OHIO 45242-3706 513 733-5336, FAX 513 733-5347 WEST COAST OFFICE 11 SANTA YORMA COURT NOVATO, CALIFORNIA 94945 800 280-8071, FAX 415 893-9469

Results Lead

Client #	DCL #	Sample Volume (L)	μg/sample	mg/m³
HGAS01	03-25415	270.6	ND	<0.004
HGAS02	03-25416	277.4	ND	<0.004
HGAS03	03-25417	175.4	ND	<0.006
HGAS04	03-25418	181.3	ND	<0.006
HGBlank01	03-25419	0	ND	-
HGBlank02	03-25420	0	ND	-
HGBlank03	03-25421	0	ND	-
	Prep Blank		ND	
% Recovery	LCS		101.	
RPL			1.	

ND = not detected at or above the reporting limit (RPL). LCS = laboratory control sample.





DATA CHEM LABORATORIES, IN	7
----------------------------	---

Company Name __

Person to Contac

Telephone (4(5) 436

REQUEST FOR ANALYSES

Client Sample

Number

HGASOI

Fax Telephone (4//5)

Address

City

ANALYTICAL REQUEST FORM

REGULAR Status (5 working days from receipt) RUSH Status Required - ADDITIONAL CHARGE CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES Quote No. _ COMMANDER, USACHPPM **Sample Collection** ATTN: MCHB-TS-OFS 5158 BLACKHAWK ROAD APG, MD 21010-5403 Sampling Site HAGERS TOWN NG Armory Industrial Process Date of Collection 12 Time Collected **Date of Shipment** Billing Address (if different from above) QC Requi Signature Media Sample Volume ANALYSES REQUESTED - Use Method Number if Known Type* (Liters) 270.6 LEAD NIOSH 7300 175.4 11 181.3

CHAIN OF CUSTODY

Non-Responsive	Dete/Time 22 AUG 2003	Received by: (Signature) PUBCEL	<u></u>	8 a de
Reinquished by: (Signature)		Received by: (Signature)		Date / Time

4388 Giendale Milford Road / Cincinnati, OH 45242 • 800-458-1493 or 513-733-5336 / Fax: 513-733-5347

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Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

August 26, 2003

Laboratory Code:

RES

Subcontract Number:

NA RES 96612-1

Laboratory Report: Project Description:

None Given

Hagerstown Armory

Non-Responsive

Army National Guard IH - West 3401 Quebec Street, Suite 7200 Denver CO 80207

Dear Customer,

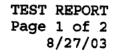
Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the American Industrial Hygiene Association, Lab ID 101533 - Accreditation Certificate #480. The laboratory is currently proficient in both PAT & ELPAT programs respectively.

Reservoirs has analyzed the following sample(s) using Atomic Emission Spectroscopy - Inductively Coupled Plasma (AES-ICP) per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the analysis table. Results have been sent to your office.

RES 96612-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those authorized by the client. Samples will be disposed of after sixty days unless longer storage is requested. If you should have any questions about this report, please feel free to call me at 303-964-1986.



President





Submitted To:

Commander, USACHPPM

5158 Blackhawk Road, Attn: MCHB-TS-OFS

APG, MD 21010-5403

Reference Data:

Lead Client Sample No.:

HGAS01 through HGBlank03 P.O. No.: Not Available

Sample Location:

Hagerstown NG Armory Sample Type: Filter

Method Reference: NIOSH 7300 DCL Set ID No.: 03-S-4147

DCL Sample ID No.:

03-25415 through 03-25421

Sample Receipt Date:

8/27/2003 08/27/03

Preparation Date: Analysis Date:

08/27/03

The samples were prepared and analyzed in accordance with NIOSH method 7300 using a Perkin Elmer 3000XL ICP.

The sample condition upon receipt was acceptable except where noted.

The results are in the enclosed data table. Results relate only to the items tested and are not blank corrected unless indicated in the data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.



Reviewet

CINCINNATI OFFICE 4388 GLENDALE-MILFORD ROAD CINCINNATI, OHIO 45242-3706 513 733-5336, FAX 513 733-5347 WEST COAST OFFICE 11 SANTA YORMA COURT NOVATO, CALIFORNIA 94945 800 280-8071, FAX 415 893-9469

TEST REPORT Page 2 of 2 03-S-4147

Results Lead

Client #	DCL #	Sample Volume (L)	μg/sample	mg/m³
HGAS01	03-25415	270.6	ND	<0.004
HGAS02	03-25416	277.4	ND	<0.004
HGAS03	03-25417	175.4	ND	<0.006
HGAS04	03-25418	181.3	ND	<0.006
HGBlank01	03-25419	0 .	ND	
HGBlank02	03-25420	0	ND	-
HGBlank03	03-25421	0	ND	-
	Prep Blank		ND	
% Recovery	LCS		101.	
RPL			1.	

ND = not detected at or above the reporting limit (RPL). LCS = laboratory control sample.





RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD BY WIPE SAMPLING

RES Job Number:

RES 96612-1

Client:

Army National Guard IH - West

Client Project Number / P.O.:

None Given

Client Project Description:

Hagerslown Armory

Date Samples Received:

August 19, 2003 USEPA SW846 3050B / AA(7420)

Analysis Type: Turnaround:

3-5 Day

Date Samples Analyzed:

August 22, 2003

Client	Lab	Sample	LEAD	Detection	LEAD
1D Number	1D Number	Area	(µg)	Limit	CONCENTRATION
		(sq.ft.)		(µg/sq.ft.)	(μg/sq.fL)
HGBLANKI	EM 806527	0.11	BDL	23	BDL
HGBLANK2	EM 806528	0.11	BDL	23	BDL
HGW01	EM 806529	0.11	BDL	23	BDL
HGW02	EM 806530	0.11	BDL	23	BDL
HCW03	EM 806531	0.11	BDL	23	BDL
HGW04	EM 806532	0.11	25.5	23	232
HGW05	EM 806533	0.11	BDL	23	BDL
HGBLANK3	EM 806534	0.11	BDL	23	BDL
HGW06	EM 806535	0.11	280.0	23	2545
HGW07	EM 806536	0.11	BDL	23	BDL
HGW08	EM 806537	0.11	BDL	23	BDL
HGW09	EM 806538	0.11	BDL	23	BDL
HGW10	EM 806539	0.11	2.6	23	24
HGW11	EM 806540	0.11	BDL	23	BDL
HGW12	EM 806541	0.11	BDL	23	BDL
HGW13	EM 806542	0.11	BDL	23	BDL
HGW14	EM 806543	0.11	BDL	23	₿DL
HGW15	EM 806544	0.11	BDL	23	BDL

^{*}Calculations Based On A 1 sq.ft. Sample Area Unless Otherwise Noted

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NGB-AVS-SI Statement of Work, Armories

	Industria	il Hygiene Surf	face Wipe Sampl	· · · · · · · · · · · · · · · · · · ·	
Return Addi	ress	Ţ	Point of Contact	t (name & phone #)	
		.	⁸ Non-F	Responsive	
	I CH		State	•	
Sampled Fa	own Armon H	agentown	MD	Location (biografou)	
Description	of Operation	Dat	te Collected	Date Shipped	
Analysis De	sired				
Sampling D	Pata				
Lab Use Only	Sample #	Results 42	Remarks		
	H6W01	RDL	200 MIO 7 SU	pply room for table	s/chairs
	#6 wo2	BDL	FLoor Kit	cher supply room	refrigera
	H6 W 03	BDL	Pre parati	ion counterinl	kitchen
	HG W04	232	Floor nea	ar frontsfold IF	R
	H6 1405	BDL 2545	Floor out	side door to ol ar where baff	d IFR
	HEWOL	i .	Floor neo	ar where baff	Ye uself
	46 WO7	BDL	1	room 113	
	HG W08	Bb4,	Driu area	a floor near Ki-	tche w
	46 WO 9	BDL		r128indrill	
	H6 W10	24	Floor at	t bottom of ste	insto
	46 WIL	BDL	10000		
	1+6W12	BDL	TOP OF (Cabinets in Ho	9
Comments	to Lab:	* .	0FF1CE(729th)	

NGB-AVS-SI Statement of Work, Armories

	Indus	trial Hygiene St	arface Wipe San	nple Sheet	
	·	<u> </u>	Point of Cont	act (name & phone #)	
Ketum Ada	etum Address				
			Samples Coll	ected By	
Sampled Fa	clity	сну /1 /	State	Location (bidg/area)	
Hazera	town Armen	a Hagerch	Date Collected	Date Shipped	
Description	of Operation	/ / [ATS CONSCUS	Date Supped	
Analysis De	rstred				
				·	
Sampling D	·-· -	1	<u> </u>		
Lab Use Only	Sample #	Results	Remarks		
	HGW13	8 p C_	Floor vv	op IN OMS & DESKTOP C GRE ONNEW	<u>~ 0,</u>
	H6014	BOL	DESKT	OP IN OMS &	f f ic
	H6 VK	1006	- 70 P 0 t	DESKTOP C	abi
			in off	give onnew	5 id
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APPENDIX E

REFERENCES

APPENDIX E

REGULATIONS AND STANDARDS

- 1. Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Administration, current ed. http://www.osha.gov/comp-links.html.
- 2. Department of Defense Instruction (DODI) 6055.1, Department of Defense Occupational Safety and Health (OSH) Program, August 19, 1998. http://www.dtic.mil/whs/directives/corres/pdf/i60551_081998/i60551p.pdf.
- 3. AR 40-5, Medical Service, Preventive Medicine, 15 October 1990. http://www.usapa.army.mil/pdffiles/r40 5.pdf.
- 4. AR 385-10, The Army Safety Program, 29 February 2000. http://www.usapa.army.mil/pdffiles/r385_10.pdf.
- 5. DA PAM 40-503, Medical Services, Industrial Hygiene Program, 30 October 2000. http://www.usapa.army.mil/pdffiles/p40 503.pdf.
- 6. Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs), American Conference of Governmental Industrial Hygienists (ACGIH), current ed.
- 7. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 62-2002, Ventilation for Acceptable Indoor Air Quality.
- 8. RP-1-1993, Office Lighting, ANSI/ESNA.

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APPENDIX F

LEAD CLEANING GUIDANCE





CHAPTER 14: CLEANING

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Step-by-Step Summary



Cleaning: How To Do It

- Include step-by-step procedures for precleaning, cleaning during the job, and daily and final cleanings in project design or specifications.
- 2. Assign responsibilities to specific workers for cleaning and for maintaining cleaning equipment.
- 3. Have sufficient cleaning equipment and supplies before beginning work.
- 4. If contamination is extensive, conduct precleaning of the dwelling unit. Move or cover all furniture and other objects.
- Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust.
 Decontamination of all tools, equipment, and worker protection gear is required before it leaves containment areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
- 6. Schedule sufficient time (usually 30 minutes to an hour) for a complete daily cleaning, starting at the same time near the end of each workday after lead hazard control activity has ceased.
- For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
- Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
- Wash all surfaces with a lead-specific detergent, high-phosphate detergent, or other suitable cleaning agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every room is cleaned.
- 10. Repeat step 8. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed (see Chapter 11). Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not overexposed.
- 11. After final cleaning, perform a visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work. This visual examination should be performed by the owner or an owner's representative who is independent of the lead hazard control contractor.
- 12. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after the other construction work has been completed.
- 13. Paint or otherwise seal treated surfaces and interior floors.
- 14. Conduct a clearance examination (see Chapter 15).
- 15. If clearance is not achieved, repeat the final cleaning.



-Step-by-Step Summary (continued) -



- 16. Continue clearance testing and repeated cleaning until the dwelling achieves compliance with all clearance standards. As an incentive to conduct ongoing cleaning and a thorough final cleaning, the cost of repeated cleaning after failing to achieve clearance should be borne by the contractor as a matter of the job specification, not the owner.
- 17. Do not allow residents to enter the work area until cleaning is completed and clearance is established.
- 18. Cleaning equipment list:
 - ♦ HEPA vacuums.
 - Detergent.
 - ♦ Waterproof gloves.
 - Rags.
 - Sponges.
 - Mops.
 - Buckets.
 - ♦ HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs).
 - 6-mil plastic bags.
 - Debris containers.
 - Waste water containers.
 - Shovels.
 - Rakes.
 - Water-misting sprayers.
 - 6-mil polyethylene sheeting (or equivalent).





I. Introduction

This chapter describes cleaning procedures to be employed following abatement and interim control work. Dust removal as an interim control measure is covered in Chapter 11.

All lead hazard control activities can produce dangerous quantities of leaded dust. Unless this dust is properly removed, a dwelling unit will be more hazardous after the work is completed than it was originally. Once deposited, leaded dust is difficult to clean effectively. Whenever possible, ongoing and daily cleaning of leaded dust during lead hazard control projects is recommended. Ongoing and daily cleaning is also necessary to minimize worker exposures.

Cleaning is the process of removing visible debris and dust particles too small to be seen by the naked eye. Removal of lead-based paint hazards in a dwelling unit will not make the unit safe unless excessive levels of leaded dust are also removed. This is true regardless of whether the dust was present before or generated by the lead hazard control process itself. Improper cleaning can increase the cost of a project considerably because additional cleaning and clearance sampling will be necessary. However, cleaning and clearance can be achieved routinely if care and diligence are exercised.

A. Performance Standard

Although the cleaning methods described in this chapter are feasible and have been shown to be effective in meeting clearance standards, other methods may also be used if they are safe and effective. This performance-oriented approach should stimulate innovation, reduce cost, and ensure safe conditions for both residents and workers.

B. Small Dust Particles

Dust particles that are invisible to the naked eye remain on surfaces after ordinary cleaning procedures. A visibly clean surface may contain high and unacceptable levels of dust particles and require special cleaning procedures.

C. Difficulties in Cleaning

While cleaning is an integral and essential component of any lead hazard control activity, it is also the most likely part of the activity to fail.

Several common reasons for this failure include low clearance standards, worker inexperience, high dust-producing methods, and deadlines.

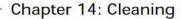
1. Low Clearance Standards

Because very small particles of leaded dust are easily absorbed by the body when ingested or inhaled, a small amount can create a health hazard for young children. Therefore, "clearance standards" are extremely low for acceptable levels of leaded dust particles on surfaces after hazard control activities, and careful cleaning procedures are required. Although it is not possible to remove all leaded dust from a dwelling, it is possible to reduce it to a safe level.

Clearance standards are described more fully in Chapter 15. The permissible amount of leaded dust remaining on each of the following surfaces following lead hazard work is as follows:

- 100 μg/ft² on floors.
- 500 µg/ft² on interior window sills (stools).
- 800 µg/ft² on window troughs (the area where the sash sits when closed).
- 800 μg/ft² on exterior concrete.

These levels are based on wipe sampling.
Clearance testing determines whether the premises or area are clean enough to be reoccupied after the completion of a lead paint hazard control project. A cleaned area may not be reoccupied until compliance with clearance standards has been established. To prevent delays, final testing and final cleaning activities should be coordinated.







2. Worker Inexperience

To understand the level of cleanliness required to meet the established clearance standards for hazard control cleanup, new hazard control personnel often require a significant reorientation to cleaning. Many construction workers are used to cleaning up only dust that they can see, not the invisible dust particles that are also important to remove.

3. High Dust-Producing Methods and/or Inadequate Containment

High dust-generating methods, inadequate containment during hazard control work, and poor work practices can all make achievement of clearance particularly difficult. Work practices necessary to prevent spreading of dust throughout a dwelling (e.g., by tracking dust out of work areas) are essential but sometimes tedious. Essential work practices are sometimes mistakenly considered to be "flexible guidelines" rather than necessary standards that are designed to ensure that the job is completed, not only safely, but also on time and within budget.

4. Deadlines

Daily and final cleanings have sometimes been compromised due to project deadlines, since cleaning comes at the end of the job. Hurried efforts often result in clearance failure. Delayed and over-budget hazard control projects are often the result of repeated, unplanned recleanings that are necessitated by inadequate containment and sloppy work practices.

II. Coordination of Cleaning Activities

A. Checklist

The owner or contractor may use the following cleaning checklist before any lead hazard control activity:

- ✓ Is the critical importance of cleaning in a hazard control project understood?
- ✓ Have all workers been trained and certified for hazard control work?

- ✓ Have the precleaning, daily, and final cleanings been scheduled properly and coordinated with the other participants in the hazard control process?
- ✓ Have cleaning equipment and materials been obtained?
- ✓ Do the workers know how to operate and maintain special cleaning equipment, and do they have directions for the proper use of all cleaning materials?
- ✓ Have all workers carefully studied the step-by-step procedures for precleaning (if needed), in-progress cleaning, and daily and final cleanings?
- ✓ Are all workers properly protected during the cleaning processes (see Chapter9)?
- ✓ Have provisions been made to properly contain and store potentially hazardous debris (see Chapter 10)?
- ✓ Have dust-clearance testing and related visual inspections been arranged (see Chapter 15)?
- ✓ Are the clearance criteria to be met fully understood?
- ✓ Have all appropriate surfaces been properly painted or otherwise sealed?
- ✓ Have appropriate records been maintained that document participants' roles in the hazard control project?

B. Equipment Needed for Cleaning

The following equipment is needed to conduct cleaning: high-efficiency particulate air (HEPA) vacuums and attachments (crevice tools, beater bar for cleaning rugs), detergent, waterproof gloves, rags, sponges, mops, buckets, 6-mil plastic bags, debris containers, waste water containers, shovels, rakes, water-misting sprayers, and 6-mil polyethylene plastic sheeting (or equivalent).





C. Waste Disposal

Regulations governing hazardous and nonhazardous waste storage, transportation, and disposal affect both the daily and final cleaning procedures. The hazard control contractor and the disposal contractor should work together to establish formal written procedures, specifying selected containers, storage areas, and debris pickups, to ensure that all relevant regulations are met.

III. Cleaning Methods and Procedures

Many of the special cleaning methods and procedures detailed in this chapter are not standard operating procedure for general home improvement contractors. Therefore, project designers, responsible agencies, or owners must ensure that contractors follow the methods and procedures recommended herein or specially designed alternative procedures, even though some may appear to be redundant and unnecessary. These methods have been shown to be feasible and effective in many situations and skipping steps in the cleaning procedures can be counterproductive.

A. Containment

Because of the difficulty involved in the removal of fine dust, dust generated by hazard control work should be contained to the extent possible to the inside of work areas. Inadequately constructed or maintained containment or poor work practices will result in additional cleaning efforts, due to dust that has leaked out or been tracked out of the work area (see Chapter 8).

B. Basic Cleaning Methods: Wet Wash and Vacuum Cleaning Techniques

Because leaded dust adheres tenaciously, especially to such rough or porous materials as weathered or worn wood surfaces and masonry surfaces (particularly concrete), workers should be trained in cleaning methods. As a motivator,

some contractors have awarded bonuses to workers who pass clearance the first time.

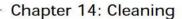
Two basic cleaning methods have proven effective, when used concurrently, in lead-based paint hazard control projects: a special vacuum cleaner equipped with a HEPA exhaust filter, followed by wet washing with special cleaning agents and rinsing, followed by a final pass with the HEPA vacuum.

Although HEPA filtered vacuums and triso-dium phosphate (TSP) cleaners have been considered the standard cleaning tools for lead hazard control projects, new research, discussed under the "Alternatives Methods" section in this chapter, suggests that other tools and products may also be effective in efficiently cleaning dust while providing adequate worker protection from airborne exposure risks. Some of these innovations may even be superior.

1. HEPA Vacuuming

HEPA vacuums differ from conventional vacuums in that they contain high-efficiency filters that are capable of trapping extremely small, micron-sized particles. These filters can remove particles of 0.3 microns or greater from air at 99.97 percent efficiency or greater. (A micron is 1 millionth of a meter, or about 0.00004 inches.) Some vacuums are equipped with an ultra-low penetration air (ULPA) filter that is capable of filtering out particles of 0.13 microns or greater at 99.9995 percent efficiency. However, these ULPA filters are slightly more expensive, and may be less available than HEPA filters.

Vacuuming with conventional vacuum machines is unlikely to be effective, because much of the fine dust will be exhausted back into the environment where it can settle on surfaces. A recent Canadian study revealed that finedust air levels were exceedingly high when a standard portable vacuum with a new bag was used, although partially filled bags were found to be more efficient (CMHC, 1992). Considerations for the proper use of a HEPA vacuum are listed below.







Operating Instructions

There are a numerous manufacturers of HEPA vacuums. Although all HEPA vacuums operate on the same general principle, they may vary considerably with respect to specific procedures, such as how to change the filters. To ensure the proper use of equipment, the manufacturer's operating instructions should be carefully followed and if possible, training sessions arranged with the manufacturer's representative.

Although HEPA vacuums have the same "suction" capacity as ordinary vacuums that are comparably sized, their filters are more efficient. Improper cleaning or changing of HEPA filters may reduce the vacuum's suction capability.

Special Attachments

Because the HEPA vacuum will be used to vacuum surfaces other than floors, operators should buy attachments and appropriate tool kits for use on different surfaces—such as brushes of various sizes, crevice tools, and angular tools.

Selecting Appropriate Size(s)

HEPA vacuums are available in numerous sizes, ranging from a small lunchbucket-sized unit to track-mounted systems. Two criteria for size selection are the size of the job and the type of electrical power available. Manufacturer recommendations should be followed.

Wet-Dry HEPA Vacuums

Some hazard control contractors have found the wet-dry HEPA vacuums to be particularly effective in meeting clearance standards. These vacuums are equipped with a special shut-off float switch to protect the electrical motor from water contact.

Prefilters

HEPA filters are usually used in conjunction with a prefilter or series of prefilters that trap the bulk of the dust in the exhaust airstream, particularly the larger particles. The HEPA filter traps most of the remaining small particles that have passed through the prefilter(s). All filters must be maintained and replaced or

cleaned as specified in the manufacturer's instructions. Failure to do so may cause a reduction in suction power (thus reducing the vacuum's efficiency and effectiveness). Failure to change prefilters may damage the vacuum motor and will also shorten the service life of the HEPA filter, which is far more expensive than the prefilters.

HEPA Vacuuming Procedures

Surfaces frequently vacuumed include ceilings, walls, floors, windows, interior and exterior sills, doors, heating, ventilation, and air conditioning (HVAC) equipment (heating diffusers, radiators, pipes, vents), fixtures of any kind (light, bathroom, kitchen), built-in cabinets, and appliances.

To aid in dislodging and collecting deep dust and lead from carpets, the HEPA vacuum must be equipped with a beater bar (agitator head) that is fixed to the cleaning head. This bar should be used on all passes on the carpet face during dry vacuuming (see Chapter 11 for details on carpet and furniture cleaning).

All rooms and surfaces should be included in the HEPA vacuum process, except for those that (1) were found not to have lead-paint hazards and were properly separated from work areas before the process began (see Chapter 8), or (2) were never entered during the process. Porches, sidewalks, driveways, and other exterior surfaces should be vacuumed if exterior hazard control work was conducted, or if debris was stored or dropped outside. Vacuuming should begin on the ceilings and end on the floors, sequenced to avoid passing through rooms already cleaned, with the dwellings' entryway cleaned last.

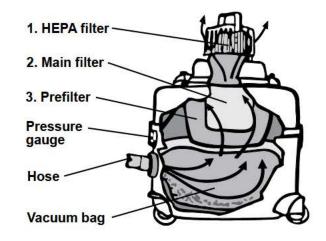
Emptying the HEPA Vacuum

Used filters and vacuumed debris are potentially hazardous waste and should be treated accordingly (see Chapter10). Therefore, operators should use extreme caution when opening the HEPA vacuum for filter replacement or debris removal to avoid accidental release of accumulated dust into the environment. This may occur, for example, if the vacuum's seal has been broken and the vacuum's bag is disturbed.





Figure 14.1a Vacuum With a HEPA Filter.



Parts of a HEPA-vacuum

Most HEPA-vacuums have three filters: HEPA filter, main filter, and prefilter. Debris gets sucked in through the hose into the vacuum bag. The air and dust get filtered through the prefilter, the main filter, and the HEPA filter. The HEPA filter captures the lead dust before the air is released into the work area again.

Operators should also wear a full set of protective clothing and equipment, including appropriate respirators, when performing this maintenance function, which should be done in the containment area or offsite.

2. Wet Detergent Wash

Several types of detergents have been used to remove leaded dust. Those with a highphosphate content (containing at least 5 percent trisodium phosphate, also known as TSP) have been found to be effective when used as part of the final cleaning process (Milar, 1982). TSP detergents are thought to work by coating the surface of dusts with phosphate or polyphosphate groups which reduces electrostatic interactions with other surfaces and thereby permits easier removal. Because of environmental concerns some States have restricted the use of TSP, and some manufacturers have eliminated phosphates from their household detergents. However, high-TSP detergents can usually be found in hardware stores and may be permitted for limited use, such as lead hazard control.

Other non-TSP cleaning agents developed specifically for removing leaded dust have also been found to be effective (possibly more effective than TSP) in limited trials by several



Pressure gauge

Figure 14.1b Pressure Gauge Indicator Shows When Filters Require Changing.





Figure 14.2 HEPA Vacuum Sizes and Tools.

investigators (Grawe, 1993; Wilson, 1993) and may also be safer, since TSP is a skin and eye irritant. See section VII for more information on non-TSP detergents. Proper procedures for using high-phosphate detergents also apply to most other types of detergents and include the following steps:

Manufacturer's Dilution Instructions

Users of cleaning agents for leaded dust removal should follow manufacturer's instructions for the proper use of a product, especially the recommended dilution ratio. Even diluted, trisodium phosphate is a skin irritant and users should wear waterproof gloves. Eye protection should also be worn, and portable eyewash facilities should be located in or very near the work area. Consult manufacturer's directions for the use of other detergents.

Appropriate Cleaning Equipment

Because a detergent may be used to clean leaded dust from a variety of surfaces, several types of application equipment are needed, including cleaning solution spray bottles, wringer buckets, mops, variously sized hand sponges, brushes, and rags. Using the proper equipment on each surface is essential to the quality of the wetwash process.

Proper Wet-Cleaning Procedures

At the conclusion of the active lead hazard control process and the initial HEPA vacuuming, all vacuumed surfaces should be thoroughly and completely washed with a high-phosphate solution or other lead-specific cleaning agent (or equivalent) and rinsed. Select a detergent that does not damage existing surface finishes (TSP may damage some finishes). Work should proceed from ceilings to floors and sequenced to avoid passing through rooms already cleaned.

Changing Cleaning Mixture

Many manufacturers of cleaners will indicate the surface area that their cleaning mixture will cover. To avoid recontaminating an area by cleaning it with dirty water, users should follow manufacturer-specified surface-area limits. However, regardless of manufacturers' recommendations, the cleaning mixture should be changed after its use for each room. As a rule of thumb, 5 gallons should be used to clean no



Figure 14.3 Goggles, Face Shields, Gloves, and Eye Wash Facilities Should Be Available When Used With Chemicals Such as TSP. EMERGENCY EYE WASH STATION

more than 1,000 square feet. Used cleaning mixture is potentially hazardous waste (see Chapter 10); consult with your local water and sewage utility for directions on its proper disposal. Wash water should never be poured onto the ground. The wash water is usually filtered and then poured down a toilet (if the local water authority approves).

Latex

3. The HEPA/Wet Wash/HEPA Cycle

Typical Procedures

Neoprene

The usual cleaning cycle that follows lead hazard control activities is called the HEPA vacuum/wet wash/HEPA cycle and is applied to an entire affected area as follows:

First, the area is HEPA vacuumed.

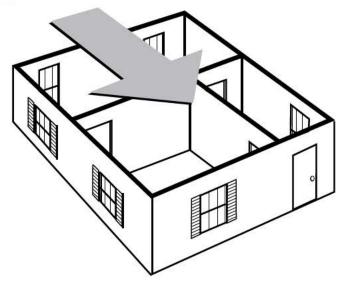
Nitrile



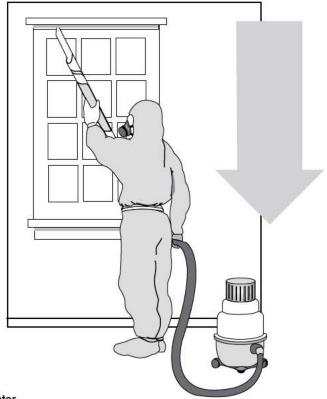


Figure 14.4a The HEPA Vacuum, Wet Wash, HEPA Vacuum Cycle Helps in Meeting Clearance Standards.

HEPA vacuum all surfaces Start at the end farthest from the main entrance/exit. As you vacuum, move towards the main exit and finish there.



Begin at the top of each room and work down. For example, start with the top shelves, the top of the woodwork, and so on, and work down to the floor. Do every inch of the windows, especially the window troughs.



Courtesy: Alice Hamilton Occupational Health Center





- Next, the area is washed down.
- After drying, the area is again HEPA vacuumed.

The rationale for this three-pass system is as follows:

- The first HEPA vacuum removes as much dust and remaining debris as possible.
- The wet wash further dislodges dust from surfaces.
- The final HEPA cycle removes any remaining particles dislodged but not removed by the wet wash.

Single-Pass Wet Wash/HEPA Vacuum

Some lead hazard control contractors have found HEPA spray cleaner vacuums to be a cost-effective alternative to the three-pass system. Similar to home carpet-cleaning machines, these vacuums simultaneously deliver a solution to the surface and recover the dirty solution. Theoretically, this process combines two of the steps in the HEPA vacuum/wet wash/HEPA cycle into one step. While anecdotal evidence indicates that the spray cleaner wet wash/HEPA is effective for some uses, limitations have been noted in its use for ceilings, vertical surfaces, and hard to reach areas. This device may be used as long as clearance standards are met.

Figure 14.4b (continued)

Use special attachments

Use the rubber cone where the floor meets the baseboard and along all the cracks in the floor boards. Use the brush tool for walls and woodwork.

Use the wheeled floor nozzle for bare floors and the carpet beater for rugs.

Move slowly

Vacuum slowly so the HEPA vacuum can pick up all the lead dust.



Rubber Cone

Dust Brush



Powered Carpet Beater



Wheeled Floor Nozzle





Figure 14.4c (continued)

Wash all surfaces with suitable detergents

Wash all surfaces in the work area with suitable detergents, including areas that had been covered with plastic. Some wallpaper should only be HEPA vacuumed, since it may be damaged by the detergent.



Wipe All Surfaces



Wet Mop Floor



Don't Dry Sweep





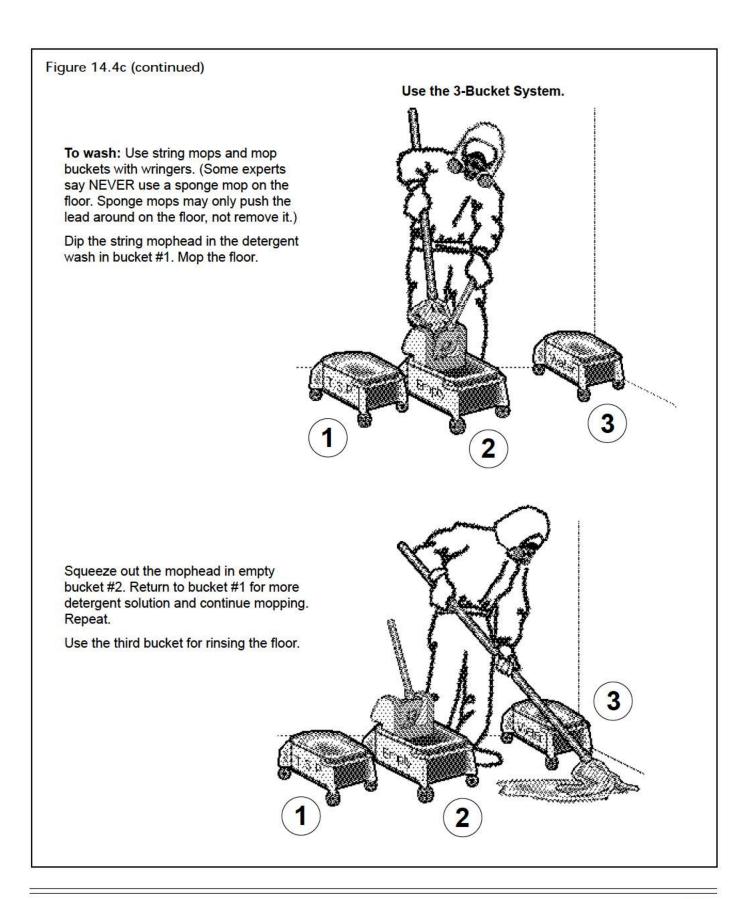


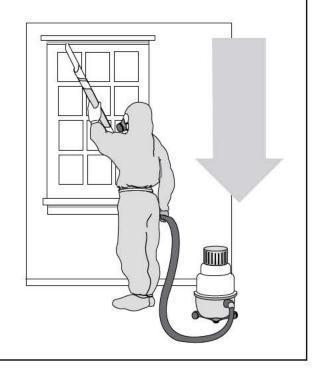




Figure 14.4d (continued)

HEPA vacuum all surfaces a final time HEPA vacuum *all surfaces* in the work area, including areas that had been covered with plastic.

Starting at the far end, work towards the decontamination area. Begin with ceilings or the top of the walls and work down, cleaning the floors last. Do every inch of the windows, especially the troughs. Use the corner tool to clean where the floor meets the baseboard and all the cracks in the floor boards. Use the brush tool for the walls. Move slowly and carefully to get all the dust.



4. Sealing Floors

Before clearance, all floors without an intact, nonporous coating should be coated. Sealed surfaces are easier for residents to clean and maintain over time than those that are not sealed. Wooden floors should be sealed with a clear polyurethane or painted with deck enamel or durable paint. Vinyl tile, linoleum, and other similar floors should be sealed with an appropriate wax. Concrete floors should be sealed with a concrete sealer or other type of concrete deck enamel. However, if these floors are already covered by an effective coat of sealant, it may be possible to skip this step.

As an alternative to sealing, floors may be covered with new vinyl tile, sheet vinyl, linoleum flooring, or the equivalent to create a more permanent cleanable surface. New surfaces should be cleaned with a cleaning solution that is appropriate for that type of surface.

IV. Order of Cleaning Procedures During Lead Hazard Control

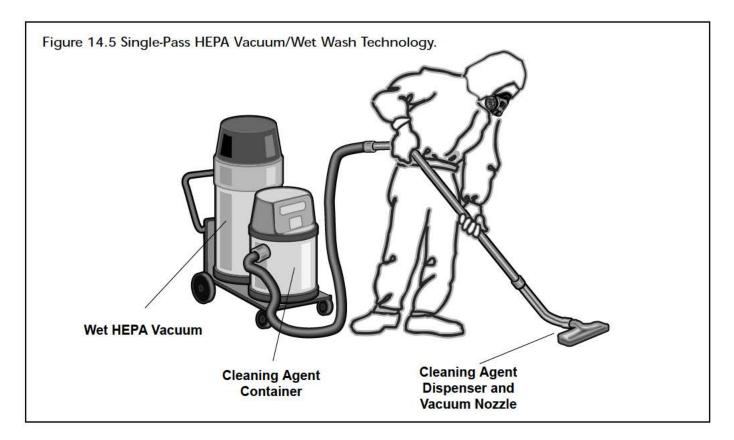
The special cleaning procedures to be followed during a lead-based paint hazard control project are discussed in chronological order below. Skipping steps in the process may result in failure to meet post-lead hazard control clearance standards.

A. Precleaning Procedures

Precleaning (i.e., cleaning conducted before lead hazard control is begun) is necessary only in dwelling units that are heavily contaminated with paint chips. Precleaning involves the removal of large debris and paint chips, followed by HEPA vacuuming. These steps may be followed by removal of occupant personal possessions, furniture, or carpeting, depending on the







Worksite Preparation Level selected (see Chapter 8). If the furniture will not be cleaned, it should be removed from the area or covered with plastic prior to beginning the precleaning procedure. Carpeting should always be misted before its removal to control the generation of hazardous dust.

It is usually the resident's responsibility to remove most of his or her personal possessions. However, if necessary, owners or project management should be prepared to complete this activity before lead hazard control work begins. As a last resort, the contractor may pack any remaining belongings and carefully seal and move the boxes, supplying all necessary boxes, packing materials, and staff to complete the task. Following cleaning and clearance, the contractor should return all packed items to their appropriate places. Leaving these tasks to the contractor may be expensive and inefficient, since the contractor will need to be insured for this function if the occupant's



Figure 14.6 Precleaning Is Needed in Areas Where Contamination and Deterioration Are High.





belongings are damaged. Additionally, moving furniture, rugs, drapes, and other items owned by the occupant could increase leaded dust levels. Clearance should be conducted after cleaning but before resident items are moved back in.

B. Ongoing Cleaning During the Job

Periodic HEPA vacuuming during the lead hazard control work may be necessary to minimize tracking of dust and paint chips from one area to another (e.g., when a large amount of paint chips or dust is being generated).

C. Daily Cleaning Procedures

Cleaning activity should be scheduled at the end of each workday when all active lead hazard control throughout the dwelling has ceased. Sufficient time must be allowed for a thorough and complete cleaning (usually about 30 minutes to an hour). Daily cleaning helps achieve clearance dust levels by minimizing problems that may otherwise occur during final cleaning and limiting worker exposures. While daily cleaning can be skipped in vacant dwelling units, it is required when occupants will



Figure 14.7 Plastic Sheeting Should Be Repaired as Part of Daily Cleanup.

return in the evening. Under no circumstances should debris or plastic be left outside overnight in an unsecured area, even if the dwelling is vacant. Daily cleaning should consist of:

- Removing large debris.
- Removing small debris.
- HEPA vacuuming, wet clean, HEPA vacuuming (horizontal surfaces only).
- Cleaning exterior.
- Patching and repairing plastic sheeting.
- Securing debris/plastic.

1. Large Debris

Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to a secure area on the property designated for waste storage. All sharp corners, edges, and nails should be hammered down to prevent injury and minimize the tearing of plastic. It is not necessary to wrap each individual piece of debris in plastic if the entire load can be wrapped. A secure area either outside or inside the property must be designated as a temporary waste-storage area. Covered, secured, and labeled dumpsters placed on or near the property may be used. Proper segregation of waste should be enforced at this time (see Chapter 10).

2. Small Debris

After being misted with water, small debris should be swept up, collected, and disposed of properly. The swept debris should be placed in double 4-mil or single 6-mil polyethylene (or equivalent) plastic bags, properly sealed, and moved to the designated trash storage area. Trash bags should not be overloaded; overloaded bags may rupture or puncture during handling and transport.

3. Exterior Cleaning

Areas potentially affected by exterior lead hazard control should be protected via a containment system (see Chapter 8). Because weather can adversely affect the efficacy of exterior





containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleaning, the immediate area should be examined visually to ensure that no debris has escaped containment. Any such debris should be raked or vacuumed and placed in single 6-mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris. HEPA vacuuming is appropriate for hard exterior surfaces, not soil.

4. Worker Protection Measures

General worker protection measures are discussed in Chapter 9. Studies indicate that during daily cleaning activities, especially while wet sweeping, workers may be exposed to high levels of airborne dust. Therefore, workers should wear protective clothing and equipment, especially appropriate respirators.

5. Maintaining Containment

The integrity of the plastic sheeting used in a lead hazard control project must be maintained. During their daily cleaning activities, workers should monitor the sheeting and immediately repair any holes or rips with 6-mil plastic and duct tape.

V. Order of Final Cleaning Procedures After Lead Hazard Control

Before treated surfaces can be painted or sealed, final cleaning procedures must be completed. Because airborne dust requires time to settle, the final cleaning process should start no sooner than 1 hour after active lead hazard control has ceased in the room. See Appendix 11 for details regarding dust settling.

A. Final Cleaning

As the first stage in the final cleaning, floor plastic should be misted and swept as detailed earlier in this chapter. Upper-level plastic, such as that on cabinets and counters, should be removed first, after it has been misted with water and cleaned. All plastic should be folded

carefully from the corners/ends to the middle to trap any remaining dust. Next, remove both layers of plastic from the floor.

Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after the cleaning and removal of other plastic sheeting; these sheets may then be misted, cleaned, and removed last.

Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plastic-removal process usually requires workers to use protective clothing and respirators.

After the plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle, starting with the ceiling and working down to the floor. After surfaces are repainted or sealed, a final HEPA/wet wash/HEPA cycle may be necessary if accumulated dust caused by other work is visible.

1. Decontamination of Workers, Supplies, and Equipment

Decontamination is necessary to ensure that worker's families, other workers, and subsequent properties do not become contaminated. Specific procedures for proper decontamination of equipment, tools, and materials prior to their removal from lead hazard control containment areas should be implemented, as described below and in Chapters 9 and 10.

Work clothing, work shoes, and tools should not be placed in a worker's automobile unless they have been laundered or placed in sealed bags. All vacuums and tools that were used should be wiped down using sponges or rags with detergent solutions.

Consumable/disposable supplies, such as mop heads, sponges, and rags, should be replaced, after each dwelling is completed. Soiled items should be treated as contaminated debris (see Chapter 10).







Figure 14.8a Pick Up Corners of Plastic Sheeting.



Figure 14.8b Fold Plastic Inward.

Durable equipment, such as power and hand tools, generators, and vehicles, should be cleaned prior to their removal from the site; the cleaning should consist of a thorough HEPA vacuuming followed by washing.

B. Preliminary Visual Examination

After the preliminary final cleaning effort is completed, the certified supervisor should visually evaluate the entire work area to ensure that all work has been completed and all visible dust and debris have been removed. While the preliminary examination may be performed by the lead hazard control supervisor, contractor, or owner as a preparatory step before the final clearance examination, it does not replace the independent visual assessment conducted during clearance.

If the visual examination results are unsatisfactory, affected surfaces must be retreated and/or recleaned. Therefore, it is more cost effective to have the supervisor rather than the clearance examiner perform this initial examination.

C. Surface Painting or Sealing of Nonfloor Surfaces

The next step of the cleaning process is painting or otherwise sealing all treated surfaces except floors.

Surfaces, including walls, ceilings, and woodwork, should be coated with an appropriate primer and repainted. Surfaces enclosed with vinyl, aluminum coil stock, and other materials traditionally not repainted are exempt from the painting provision.

D. Final Inspection

The final clearance evaluation should take place at least 1 hour after the final cleaning. Clearance has three purposes: 1) to ensure that the lead hazard control work is complete, 2) to detect the presence of leaded dust, and 3) to make sure that all treated surfaces have been repainted or otherwise sealed. Clearance is usually performed after the sealant is applied to the floor. See Chapter 15 for information on clearance examination procedures.

E. Recleaning After Clearance Failure

If after passing the final visual examination, the dwelling unit fails the clearance wipe dust tests,





the HEPA/wet wash/HEPA cleaning cycle should be carefully and methodically repeated. Failure is an indication that the cleaning has not been successful. Recleaning should be conducted under the direct supervision of a certified supervisor. Care should be exercised during the recleaning of "failed" surfaces or components to avoid recontaminating "cleared" surfaces or components.

VI. Cleaning Cost Considerations

An important consideration in determining lead hazard control strategies and methods is the cost and difficulty of required daily and final cleanup operations and the ease with which one can meet dust-clearance standards. A general rule of thumb is that lead hazard control strategies that generate the most dust will have higher cleanup costs and higher initial clearance test-failure rates.

A. Initial Clearance Test Failure Rates

The likelihood of passing final dust-clearance tests is highly correlated with the chosen intervention strategy, methods, and care exercised by the contractor. For example, in one study (HUD, 1991) initial wipe-test failure rates were 14 percent for interior window sills, 19 percent for floors, and 33 percent for window troughs. The pass/fail rates for each surface were strongly associated with the dwelling unit abatement strategy employed. Chemical removal and hand-scraping strategies experi-enced higher failure rates than replacement and encapsulation/enclosure strategies (see Table 14.1).

However, results of the HUD demonstration project indicated that clearance failure is not solely related to abatement method. The report stated that "the diligence and effectiveness of an abatement contractor's cleaning process ... had a major impact on ... the likelihood of the dwelling unit to pass the final wipe test clearance" (HUD, 1991).



Figure 14.8c Dispose of Plastic Sheeting in a Plastic Trash Bag.

B. Key Factors In Effective Cleaning

Effective cleaning will be aided by adequate sealing of surfaces with polyethylene sheeting prior to lead hazard control, proper daily cleaning practices, good worker training, and attention to detail. Where poor worksite preparation is employed, additional cleaning may be required to meet clearance.

C. Special Problems

Surfaces such as porous concrete, old porous hardwood floors, and areas such as corners of rooms and window troughs pose especially difficult cleaning challenges. Porous concrete and corners of rooms normally require additional vacuuming to achieve an acceptable level of cleanliness.

The lead hazard control strategy of enclosure is frequently chosen for window troughs and for old porous hardwood floors due to the difficulty of adequately cleaning these surfaces. This





option provides not only a clean surface but a more permanently cleanable surface for dwelling occupants to maintain.

VII. Alternative Methods

Alternatives to the recommended cleaning tools and practices discussed in this chapter are available, some having significant potential for increasing effectiveness and lowering costs.

A recent Canadian study (CMHC, 1992) evaluated the effectiveness of contaminated dust cleanup activities using tools that would generally be available to construction contractors and homeowners. Vinyl flooring and carpeting were cleaned using several wet/dry vacuuming systems, sweeping, and wet mopping. The study found that regular vacuums with empty bags send a steady stream of fine particles into the air, while vacuums with partially filled bags were more efficient. This finding suggests the necessity for HEPA vacuums. Other vacuums may be used if workers do not experience increased exposures, if compliance with clearance standards is achieved, and if a variance from OSHA regulation (29 CFR 1926.62 (h)(4)) is obtained by the contractor or employer (if required).

Agitator heads on vacuums were demonstrated to significantly enhance vacuum effectiveness on carpets in cleaning up fine dust without

increasing airborne dust levels. Table 14.2 suggests that a central vacuum with an agitator head is most efficient at removing dust and minimizing recontamination, probably because the vacuum exhaust is blown away from living areas. Because many houses do not have central vacuuming systems, a portable HEPA vacuum is the next best choice (see Table 14.2). Vacuums without agitator heads appeared to perform relatively poorly on carpets.

A. Vacuums

Regular (non-HEPA) dry vacuums potentially produce hazardous levels of airborne dust and therefore should be avoided. Externally exhausted vacuum units with adequate dustretaining capability may be used. The OSHA lead standard requires the use of HEPA vacuum equipment (see 29 CFR 1926.62 (h)(4), which states, "where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters").

B. Trisodium Phosphate and Other Detergents

TSP detergents have been used successfully for a number of years in lead hazard control work. However, in recent years, other new cleaning agents have been developed specifically for leaded dust removal. The need for alternatives has been fueled by the fact that TSP is an eye

Table 14.1 Initial Cleaning Wipe-Test Failure Rates for Various Abatement Strategies

Dust Test Location	Hand Scrape w/Heat Gun	Chemical Removal	Enclosure	Encapsulation	Replacement	All Methods
Floors	28.8%	22.7%	20.0%	13.8%	12.5%	19%
Sills	24.4%	24.1%	8.2%	4.8%	17.4%	14%
Wells	44.5%	45.7%	23.7%	25.7%	21.0%	33%

Source: U.S. Department of Housing and Urban Development (August 1991) The HUD Lead-Based Paint Abatement Demonstration (FHA)





and skin irritant and is increasingly restricted from household use and unavailable in many local jurisdictions. TSP also damages some finishes. Recently reported trials of two new products suggest that alternative lead-specific cleaning agents may be more effective and safer than TSP (Grawe, 1993; Wilson, 1993).

These Guidelines do not prohibit the use of non-TSP cleaning agents. HUD encourages further evaluation of alternative cleaning methods. Use of any cleaning agent that results in compliance with clearance criteria is encouraged.

Table 14.2 Mass Removal Efficiency for Extended Vacuuming Cycles

	Mass Removal Efficiency Percentages								
Cycle Number	Cleaning Method								
	Central Vacuum—Plain Tool	Central Vacuum—Agitator Head	HEPA Vacuum	Portable Vacuum—Plain Tool					
1	34.7	71.0	55.4	17.5					
2	47.0	80.2	61.2	23.0					
3	51.9	85.9	66.3	26.6					
4	56.0	87.8	67.0	29.4					
5	59.3	88.9	72.1	32.5					
6	61.6	91.2	74.4	34.9					
7	63.8	93.1	76.4	36.5					
8	67.5	95.4	77.5	38.1					
9	67.5	97.7	78.7	40.1					
10	67.2	100.0	80.2	41.7					
11		102.3	80.2	41.7					
12		104.6	84.1	44.8					
13		104.6	84.5	46.8					
14		103.8	84.5	48.4					
15				49.6					
16				50.8					
17				52.4					
18				53.6					
19				54.4					
20				55.2					

Source: Canada Mortgage and Housing Corporation: Saskatchewan Research Council (December 1992) Effectiveness of Clean-up Techniques for Leaded Paint Dust

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MDARNG Facilities IH Baseline Surveys, BG Randolph Millholland Armory, Hagerstown, MD Project No. 55-ML-01ED-03

APPENDIX G

MOLD GUIDANCE

Army Facilities Management Information Document on Mold Remediation Issues

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

Moisture Control: The Army Way to Mold Prevention!

INTRODUCTION

Concern about indoor exposure to mold has been increasing as the public becomes more aware that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions.

This document provides the best and most current guidance for remediation of clean water damage (<48 hours) and mold contamination (>48 hours) into one resourceful Army guide. This guide has been designed to provide information to facilities management individuals who have little or no experience with mold remediation. It will assist them in making a reasonable judgment as to whether the situation can be handled in-house. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor. If an outside contractor is employed, they must have experience cleaning up mold. Check their references, and have them follow the recommendations presented in this document, EPA guidelines, and/or guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH). A multi-disciplinary team approach to mold concerns is best. A health and safety professional, such as an industrial hygienist, should be consulted prior to any remediation activities to assist in the project.

Molds produce tiny spores to reproduce. Mold spores float through the indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.(1)

In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur. Any initial water infiltration should be stopped and clean up began immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. (Refer to Appendix A for detailed guidance on clean water damage response). If the source of water is elevated humidity, actions to maintain the relative humidity levels below 60% to inhibit mold growth should be taken (2). Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

MOLD PREVENTION TIPS:

[Adapted from EPA, reference 1]

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing
 the moisture level in air (humidity). To increase surface temperature, insulate or
 increase air circulation. To reduce the moisture level in air, repair leaks, increase
 ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and
 humid).
- Keep heating, ventilating, and air-conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

REMEDIATION PLANNING

- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Select cleanup methods for moldy items (Appendix B)
- Select Personal Protection Equipment (PPE)- protect remediators (Appendix B)
- Select containment equipment protect building occupants (Appendix B)
- Select remediation personnel who have the experience and training needed to implement the remediation plan and use PPE and containment as appropriate

REMEDIATE MOISTURE AND MOLD PROBLEMS

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Clean and dry moldy materials (Appendix B)
- Discard moldy porous items that can't be cleaned (Appendix B)

REMEDIATION PROCEDURES

Four levels of abatement are described below. The size of the area impacted by mold contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of mold and preventing dust contaminated with mold from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. (3)

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work. (1 and 3)

The use of bleach or other biocides is questionable in most cases (8). The effectiveness of bleach in reducing living mold is dependent on concentration, residual chlorine levels, and contact time on the surface (8). All of these factors are difficult to control during remediation. Removal of all mold growth can generally be accomplished by physical removal of materials supporting active growth and thorough cleaning of non-porous materials (4). Therefore, application of a biocide serves no purpose that could not be accomplished with a detergent or cleaning agent (4).

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."(4)

FOUR REMEDIATION LEVELS

[Adapted from NYCDOH Guidelines on Assessment and Remediation of Fungi in Indoor Environments (3) and EPA (1)]

Level I: Small Isolated Areas – Total surface area affected less than 10 square **feet** - e.g., ceiling tiles, small areas on walls. Refer to Appendix B for detailed guidance.

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Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Level II: Medium – Total Surface Area affected between 10 and 100 square feet - e.g., several wallboard panels. (See Appendix B for detailed guidance).

The following procedures at a minimum are recommended:

Refer to Appendix C for proper PPE selection. Limited or Full protection may be required depending on the situation.

Refer to Appendix D for Containment procedures.

The work area and areas directly adjacent should be covered with a single layer of 6 mil fire-retardant polyethylene sheet(s) and taped before remediation, to contain dust/debris.

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Seal ventilation ducts/grills in the work area and areas directly adjacent with 6 mil polyethylene sheeting. Use an exhaust fan with a High Efficiency Particulate Air (HEPA) filter to generate negative pressurization.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and surrounding areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level III be followed.

Level III: Large Area – Total Surface Area affected greater than 100 square feet or potential for increased occupant or remediator exposure during remediation is estimated to be significant. (See Appendix B for detailed guidance).

The following procedures are recommended:

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from occupied spaces using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air(4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If any remediation sampling is deemed necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

Level IV: Remediation of HVAC Systems (See Appendix B for detailed guidance. For a small area (<10 ft²) follow Level I guidance for PPE and containment and for a areas (>10 ft²) follow Medium (Level II) or when greater than 100 ft² follow Large (Level III) guidance for PPE and containment as discussed in Appendices B, C, and D)

A Small Isolated Area of Contamination (total surface area affected <10 square feet) in the HVAC System

The HVAC system should be shut down prior to any remedial activities.

Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended (7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Areas of Contamination (Total surface area affected >10 square feet) in the HVAC System

The following procedures are recommended:

The HVAC system should be shut down prior to any remedial activities.

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from other areas. Isolate the HVAC system using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and removed in double-bagged 6-mil plastic. When a decontamination room is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

All areas should be left dry and visibly free from contamination and debris.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air (4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If remediation sampling is necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HAZARD COMMUNICATION

When mold growth requiring Level III or IV (large-scale) remediation is found, the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners (1 and 3).

CONCLUSION

In summary, the prompt remediation of contaminated material and infrastructure repair must be the primary response to mold contamination in buildings. The simplest and most expedient remediation that properly and safely removes mold growth from buildings should be used. Widespread contamination poses much larger problems that must be addressed on a case-by-case basis in consultation with a health and safety specialist. Effective communication with building occupants is an essential component of all remedial efforts. Individuals with persistent health problems should go to the local occupational health clinic or see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures.

REFERENCES

- 1. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Ventilation for Acceptable Indoor Air Quality ASHRAE Standard (ANSI/ASHRAE 62-2001). Atlanta, Georgia, 2001.
- New York City Department of Health: Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York: New York City Department of Health, Bureau of Environmental & Occupational Disease Epidemiology, (April 2000) January 2002.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (IICRC). *IICRC S500*, *Standard and Reference Guide for Professional Water Damage Restoration*, 2nd edition. 1999.
- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

Water Damage Cleanup and Mold Prevention

Appendix A presents strategies to respond to water damage within 24-48 hours. These guidelines are designed to help avoid the need for remediation of mold growth by taking quick action before growth starts. If mold growth is found on the materials listed in Appendix A, refer to Appendix B for guidance on remediation. Depending on the size of the area involved and resources available, professional assistance may be needed to dry an area quickly and thoroughly.

Water Damage - Cleanup and Mold Prevention			
Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mold Growth£			
Water-Damaged Material†	Actions		
Books and papers	 For non-valuable items, discard books and papers. Photocopy valuable/important items, discard originals. Freeze (in frost-free freezer or meat locker) or freeze-dry. 		
Carpet and backing - dry within 24-48 hours§	 Remove water with water extraction vacuum. Reduce ambient humidity levels with dehumidifier. Accelerate drying process with fans. 		
Ceiling tiles	Discard and replace.		
Cellulose insulation	Discard and replace.		
Concrete or cinder block surfaces	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. 		
Fiberglass insulation	Discard and replace.		

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Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	 Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. Check to make sure under flooring is dry; dry under flooring if necessary. 	
Non-porous, hard surfaces (Plastics, metals)	Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.	
Upholstered furniture	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture. 	
Wallboard (Drywall and gypsum board)	 May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible. 	
Window drapes	Follow laundering or cleaning instructions recommended by the manufacturer.	
 Remove moisture immediately and use dehumidifiers, gentle heat, and fans for dry (Use caution when applying heat to hardworfloors.) Treated or finished wood surfaces may be with mild detergent and clean water and all to dry. Wet paneling should be pried away from w drying 		

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£ If mold growth has occurred or materials have been wet for more than 48 hours, consult Appendix B. Even if materials are dried within 48 hours, mold growth may have occurred. Professionals may test items if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then OSHA may have requirements for Personal Protective Equipment and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

- † If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.
- § The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*				
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment	
	SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)			
Books and papers	3			
Carpet and backing	1, 3			
Concrete or cinder block	1, 3			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum N-95 respirator, gloves, and goggles		
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		None required	
Upholstered furniture & drapes	1, 3			
Wallboard (drywall and gypsum board)	3			
Wood surfaces	1, 2, 3			

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MEDIUM - Total Surface Area Affected Between 10 and 100 ft ²				
Books and papers	3			
Carpet and backing	1,3,4			
Concrete or cinder block	1,3			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider	Limited Use professional judgment, consider	
Non-porous, hard surfaces (plastics, metals)	1,2,3	potential for remediator exposure and size of contaminated area		potential for remediator/occupant exposure and size of contaminated area
Upholstered furniture & drapes	1,3,4			
Wallboard (drywall and gypsum board)	3,4			
Wood surfaces	1,2,3			
		ce Area Affected Greater Than 100 ft ² or F iator Exposure During Remediation Estim		
Books and papers	3			
Carpet and backing	1,3,4			
Concrete or cinder block	1,3	Full	Full	
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area	Use professional judgment, consider	
Non-porous, hard surfaces (plastics, metals)	1,2,3		potential for remediator exposure and size of contaminated area	
Upholstered furniture & drapes	1,2,4			
Wallboard (drywall and gypsum board)	3,4			
Wood surfaces	1,2,3,4			

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. Consult Appendix A if materials have been wet for less than 48 hours, and mold growth is not apparent. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

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Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above

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the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Posted to NGB FOIA Reading Room

May, 2018

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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February 2002

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Industrial Hygiene/ Preventive Medicine Mold Assessment Guide

TG 278 February 2002



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Industrial Hygiene/Preventive Medicine Mold Assessment Guide

Introduction

The USACHPPM Industrial Hygiene Field Services Program receives requests from industrial hygiene (IH)/preventive medicine (PM) field personnel for information about mold investigations and clean-up procedures. Like all organisms, molds have an absolute requirement for water. The types of mold and their abundance in an area depend on the availability of nutrients (i.e., dirt), water and temperature. Chronic water intrusion, lack of adequate ventilation and moisture control, and or isolated floods, such as a water pipe bursting, are typical conditions, which lead to mold growth in buildings.

When mold growth is present, the removal and cleaning of contaminated materials must be handled with proper precautions, because disturbing this growth can result in bioaerosol release, i.e., sending millions of spores into the air.

This mold assessment guide used in conjunction with the *ARMY Facilities Management Information Document on Mold Remediation Issues* (*TG 277*)¹ will assist Industrial Hygienists and or Preventive Medicine personnel in conducting mold investigations. Since a team approach is recommended, the collaboration between IH/PM personnel and facility management personnel is vital to correct moldy conditions and prevent future mold growth. Use the following procedures and refer to Appendix A: Mold Investigation Decision Logic, for guidance on mold investigation, evaluation, and remediation for routine assessments.

Air sampling for mold should never be part of a routine assessment. Remediation strategies can generally be made on the basis of a visual inspection or confirmation with a bulk or surface sample. In addition, air sampling methods for some mold are prone to false negative results and therefore cannot be used to definitively rule out contamination².

Safety Tips While Investigating and Evaluating Mold and Moisture Problems³

- Be careful not to touch mold or moldy items with bare hands.
- Do not allow mold or mold spores to get into your eyes.
- Do not breathe in mold or mold spores.
- Consult **Appendices B, C, and D** for Remediation, Personal Protective Equipment (PPE) to be used during remediation and Containment guidance.
- Consider using PPE when disturbing mold during investigation. Depending upon the situation, a half-face NIOSH-approved N-95 respirator, gloves, and goggles are recommended.

Communicate with building occupants at all stages of process, as appropriate¹.

When mold growth requiring Level III or IV (large-scale) remediation is found (See Appendix B), the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

Routine Investigation and Evaluation of moisture and mold problems³.

- Determine the total surface area of visible mold affected (square feet).
- Consider the possibility of hidden mold.
- Clean up small mold problems and fix moisture problems before they become large problems.
- Select remediation personnel or team based on the assessment.
- Investigate areas associated with occupant complaints.
- Identify source(s) or cause of water or moisture problem(s).
- Note type of water-damaged materials (wallboard, carpet, etc.).
- Check inside air ducts and air handling unit.

Assessments Requiring Sampling

Air sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician/medical practitioner desires to confirm the causative agent.

Pre- and post-remediation air sampling may be necessary if there is evidence from a visual inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination².

When air sampling is deemed necessary and is performed, outdoor air samples should be collected at the same time at the fresh air intake, which serves the suspected area. Values obtained should be compared and the indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air⁴. If they are different, bioamplification is occurring and the problem needs corrected.

Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', "Bioaerosols: Assessment and Control⁴."

Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program. For further mold assistance, contact USACHPPM, Industrial Hygiene Field Services Program, DSN 584-3118 or (410) 436-3118.

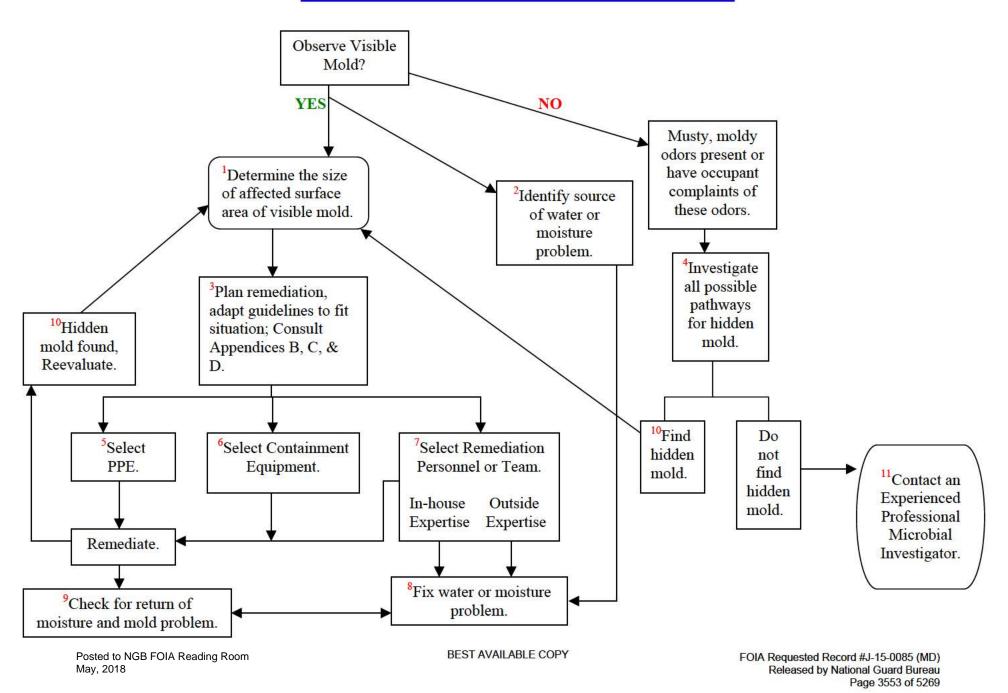
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- 3. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (IICRC). *IICRC S500*, *Standard and Reference Guide for Professional Water Damage Restoration*, 2nd edition. 1999.
- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

MOLD INVESTIGATION DECISION LOGIC

MOLD INVESTIGATION DECISION LOGIC



MOLD INVESTIGATION DECISION LOGIC NOTES:

- 1. Roughly approximate the total surface area of visible mold. Categorization of the remediation levels are sometimes borderline, so when trying to decide the category to apply, consider the extent of visible growth, such as a heavy blanket of growth on the surface, to barely visible. If heavy growth is apparent, consider moving up to the next level of protection.
- 2. Do not skip this step. Address the source of water or moisture problem or the mold will simply reappear.
- 3. Always protect the health and safety of the building occupants and remediators.
- 4. Mold may be hiding on the backside of drywall, vinyl wallpaper, or paneling, the top of ceiling tiles, the underside of carpets and pads. Check walls behind furniture, pipe chases and utility tunnels, porous thermal or acoustic liners inside ductwork, or check the rafters (due to roof leaks or insufficient insulation)³.
- 5. Utilize appendices B and C for remediation guidance. Use your best judgment during investigations, if not disturbing the mold you may need minimal to no PPE. Do not alarm building occupants unnecessarily, but protect yourself as necessary.
- 6. If the containment is working properly, the polyethylene sheeting will billow inwards on all surfaces. If it flutters or billows outward, containment has not been achieved, and you should find and correct the problem before starting your remediation activities³. Confirm negative pressure with smoke tubes.
- 7. Select remediation personnel who have the experience and training needed to implement the remediation plan.
- 8. You must completely fix or eliminate the water or moisture problem to solve the problem.
- 9. You should revisit the site(s) approximately two weeks after remediation, and it should show no signs of water damage or mold growth.
- 10. If you discover hidden mold, revise your plan by reassessing the size of moldy area.
- 11. If you believe that you have a hidden mold problem, you may want to consider hiring an experienced mold investigative professional.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

May, 2018

Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
	SMALL - Total	Surface Area Affected Less Than 10 squar	re feet (ft²)
Books and papers	3		
Carpet and backing	1, 3		None required
Concrete or cinder block	1, 3	_	
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum	
Non-porous, hard surfaces (plastics, metals)	1, 2, 3	N-95 respirator, gloves, and goggles	
Jpholstered furniture & drapes	1, 3		
Wallboard (drywall and gypsum board)	3		
Wood surfaces	1, 2, 3		
	MEDIUM - T	otal Surface Area Affected Between 10 and	l 100 ft ²
Books and papers	3	_	
Carpet and backing	1,3,4	_	
Concrete or cinder block	1,3		** ** *
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated are
Non-porous, hard surfaces (plastics, metals)	1,2,3		
Jpholstered furniture & drapes	1,3,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3		
		face Area Affected Greater Than 100 ft ² or diator Exposure During Remediation Esti	
Books and papers	3	_	
Carpet and backing	1,3,4		
Concrete or cinder block	1,3	Full	Full
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	potential for remediator/occupant exposure potential for rem	Use professional judgment, consider
Non-porous, hard surfaces (plastics, metals)	1,2,3		potential for remediator exposure and significant of contaminated area
Jpholstered furniture & drapes	1,2,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3,4		

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside
 of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

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Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

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APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to

minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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1720 Walton Road Blue Bell, PA 19422 610-828-3078 Fax 610-828-7842

March 24, 2009

E-MAIL

Ms. Non-Responsive Army National Guard ATTN: NGB-ARS-IHNE 301-IH Old Bay Lane Havre de Grace, MD 21078

Subject: Final Industrial Hygiene Assessment Report

Hagerstown Readiness Center, Hagerstown, Maryland

IES Project No. EHS08794.02

Dear Non-Responsi

IES Engineers (IES) is pleased to enclose the final report of the Industrial Hygiene assessment conducted at the Army National Guard Readiness Center facility located in Hagerstown, Maryland. Thank you for the opportunity to perform this assessment. Please contact me if you should you have any questions or require any additional information.

Sincerely,

, CIH Senior Manager, Health, Safety & Industrial Hygiene Services

, IES cc:



NATIONAL GUARD BUREAU REGION NORTH INDUSTRIAL HYGIENE OFFICE HAVRE DE GRACE, MARYLAND

FINAL INDUSTRIAL HYGIENE ASSESSMENT HAGERSTOWN READINESS CENTER 18500 ROXBURY ROAD, HAGERSTOWN, MARYLAND 21740 SURVEY DATE: JULY 17, 2008

IES PROJECT NO. EHS08794.02 REPORT DATE: MARCH 24, 2009

Prepared and submitted by:	Certified Industrial Hygienist review by:
Note-Responsive	
	, CIH
Senior Project Manager	Senior Manager, Health, Safety & Industrial
	Hygiene Services



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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Assessment Date: July 17, 2008

Purpose:

The National Guard Bureau (NGB) retained IES Engineers (IES) to assist in performing an Industrial Hygiene assessment at the Army National Guard (ARNG) Readiness Center (RC) located at 18500 Roxbury Road in Hagerstown, Maryland. The purpose of the Industrial Hygiene survey was to identify and measure the existence and extent of potentially hazardous operations or conditions at the ARNG Hagerstown RC facility. Mr. Non-Responsive, CIH, Senior Project Manager of IES, performed the assessment. Assessment activities were conducted with reference to the Statement of Work – Industrial Hygiene Services for National Guard Bureau Industrial Hygiene Region North Baseline Surveys for Readiness Centers and Administrative Buildings, May 2008, and included:

- 1) Dust sampling and analysis for lead surface contamination,
- 2) Air sampling and analysis for lead (to determine administrative personnel exposure to airborne lead),
- 3) Bulk sampling of suspected asbestos-containing building materials, or lead-containing paint (where advised),
- 4) Physical (visual) site inspection of all internal building areas to note condition of materials, particularly those suspected to be lead or asbestoscontaining, as well as potential water-damaged materials, housekeeping conditions and related safety hazards, ergonomic considerations, and indicators of indoor air quality.
- 5) Measurements of relative humidity, carbon dioxide and temperature in occupied areas of each floor, as well as lighting supporting evaluation with respect to indoor environmental standards,
- 6) Visual inspection and/or measurement of ventilation systems within the readiness center (general and local exhaust), as pertinent, supporting evaluation of indoor air quality and maintenance procedures,
- 7) Evaluation of attached garages, within the scope of readiness center operations, with respect to visual examination, hazards present, and observation/documentation of controls utilized including administrative, personal protective equipment and ventilation controls, and associated impact upon readiness center operations.

Conferred With: Captain Non-Responsive, Administrative Supervisor, Hagerstown RC



1.2 Facility Description

The Hagerstown RC is located at 18500 Roxbury Road, Hagerstown, Maryland, and is primarily designed and operated as a 34,309 square foot training facility, which includes an original section constructed in 1978 (22,699 square feet), plus an addition constructed in 1997 (11,610 square feet). The Hagerstown RC principally houses the Headquarters & Headquarters Company (HHC), 729th Support Batallion, which provides training, training support and administrative support to the Army National Guard. Predominant construction features of the facility include interior and exterior block masonry walls on concrete slab with brick exterior cladding, and insulated metal pan roof structure. Interior finishes included 12 inch square (12" x 12") floor tile, or masonry tile floors, suspended fiber acoustic ceiling tile (2' x 2'), and painted drywall partitions.

The RC includes: battalion headquarters, large classroom, administrative offices and orderly room, men's and women's locker and restrooms, drill room/floor, fitness center, distance learning center, computer/IT room and administrative office, family support office, kitchen, scullery and storage, military police vault, supply room, and split level storage area (old rifle range), HHC vault, supply room and split level storage area, boiler room, caretaker storage room, maintenance bays (FMS 7), FMS office, FMS shop offices, break room, tool and parts rooms and battery storage room.

The facility is heated, ventilated, and/or air-conditioned by multiple systems. Heating, ventilation and air-conditioning (HVAC) service is achieved predominantly via roof-mounted package HVAC units with cooling condensers. Separate localized ventilation and heating with outdoor air intakes serve the drill room and other areas. Each restroom and locker area is local-exhaust ventilated to the roof. A boiler/circulating hot water heating system is used for heating throughout most of the facility, whether via HVAC, localized fan coil units, or wall mounted registers. A Mitsubishi package heating/air-conditioning unit is located in each supply room office. The FMS #7 break room (refer to description below) contains a separate, package HVAC unit, that serves this area, and fuel oil-fired radiant heaters in the maintenance (garage) bays.

The facility is occupied by 25 personnel. The full-time complement includes: 10 active guard reserve including administrative personnel and technicians, three full-time recruiters, and two military police. Three state workers include a full-time caretaker, and one person each serving the distance learning center, and the family assistance center. The caretaker provides routine maintenance and custodial service, but does not provide any service for HVAC systems. In addition, there are seven personnel assigned to the FMS 7 unit. Normal scheduled work operations occur between Tuesday through Friday, and between the hours 0630 to 1700. Training at the facility occurs monthly on weekends. On the day of the IH assessment, the facility was fully occupied by assigned personnel.

Facility Maintenance Shop #7

A maintenance/garage section is incorporated into this facility, as part of the 1997 addition; however, this section is not utilized directly by the HHC unit. The FMS #7 is a separately operated Unit, located at the Hagerstown RC facility.



<u>Please refer to Appendix A of this report for current photographs of facility areas/conditions</u>. Refer to subsequent report sections 1.3 – Key Findings and Conclusions, and 2.0 – Operation Description and Condition for further information.

1.3 Key Findings and Conclusions

Several key findings and conclusions were noted as follows:

HVAC/Ventilation Service

- Suspended particulate load on HVAC vents was noticeable in the Batallion Headquarters. This is likely due to ineffective filtration.
- Men's Locker Room was found with strong, disagreeable odor. The exhaust fan system serving
 the men's locker was not operational during the survey. The odor conditions may also indicate
 hidden plumbing problems, or pipe chase leaks.
- The HHC and MP supply offices do not have mechanical ventilation, but are served by package heating/air-conditioning units, designed to re-circulate air. Supply room personnel may close doors during hot or cold weather extremes, leading to inadequate ventilation.
- Exhaust fans were not operational in the Fitness Center.
- Water pooling was noticeable at intake areas of certain roof-mounted package units. This condition may lead to bioaerosol amplification, and distribution into the supply air stream.
- Roof-mounted HVAC equipment filters were found to seat in a channel, but are not tight-fitting. This condition may lead to excess particle build-up on cooling coils, leading to bioaerosol amplification.

Facility Condition

- Carpet on slab covered by rubber mat was found in the Fitnesss Center. This condition may lead
 to microbial growth, particularly during summer conditions with high relative humidity, or
 ineffective air exchange.
- Classroom S4 ceiling supply vents were found with rust, indicating frequent condensation. This may indicate inadequate humidity control or air exchange in the space.
- The HHC storage area was found with continuous operating heater/fan unit, apparently due to a faulty hot water circulation valve.
- Caretaker operates washing machine serving FMS 7 and HHC field laundry needs. Further evaluation of Caretaker procedures and potential environmental contaminants, is advised.
- The boiler chemical treatment program was found managed by off-site personnel.

Sampling Results

Certain abandoned, isolated, duct components of the old firing range duct, which are not likely
to be readily disturbed, were identified. The duct surfaces appeared to have been previously
encapsulated. A small amount of residual, un-encapsulated dust is presumed to be present from
the prior lead-abatement action. Sample analysis results indicate presence of significant levels of
lead contamination in residual surface dust. This condition is not anticipated to constitute an



immediate hazard to occupants, unless the interior duct surfaces are subjected to high airflow. The condition should be further investigated.

- Surface dust concentrations of lead slightly above the 200 µg/ft2 OSHA guideline were also identified at three (3) other sample locations including: HHC lower level storage area/ top of fan heater casing, HHC supply room, top of cage rail, and Batallion Headquarters, filter compartment. The contamination is anticipated to be salient, historical, undisturbed dust; however, further evaluation is advised.
- The drill hall floor appeared to be a wood or laminated composite. Bulk sampling results indicate there is "no asbestos detected" in the material.

Refer to Section 2.2 – Specific Site Survey and Conditions for further details.

Water Leaks

- Ceiling tile was found removed in the administrative area outside the NCO's office, due to a roof
 drain leak. There is musty odor present in the space upon entry. The AGR personnel report this
 has been an ongoing problem.
- A section of the tectum ceiling in the drill hall appears water-damaged from previous or recurring leakage. The area of damage is estimated at no greater than 15% of ceiling area. The Caretaker reports there is no evidence of recurrent water leakage into the facility.

Security

• Potential unattended access into the facility from outside was noticeable. Unattended entry could readily occur through the MP lower storage entry to parking lot, and into the FMS 7 garage areas, during personnel breaks or unattended periods.

Other Ventilation

- Kitchen vent hoods serving stove and automatic dish/pot washing equipment were found functional. The general area was found clean. The kitchen is not routinely operated. Some water leakage was noticed on the floor associated with a refrigerator.
- Retractable vehicle exhaust ventilation ducts and hoods are located in each of the maintenance service (garage) bays, and found operational. Velocity measurements were collected at the FMS 7 ventilation exhaust hoods and are reported in Section 2.2 - Specific Site Survey and Conditions.



EH&S Compliance & Support

- Caretaker is required to order cleaning and chemical products through the Pikesville Armory, "Garage 13." Caretaker reports distribution may not be timely, or product may be received in limited quantity, therefore, localized purchasing may occur. Material safety data sheets are not secured during these purchases.
- Current, up-to-date MSDS were not found on-site all chemical products in Caretaker's storage. The caretaker utilizes personal protection only to extent that such protection is voluntarily used (i.e., hearing protectors or glove protection may be used during chemical use, though no particular glove types were reported to be specified for certain jobs).
- A separate flammable storage room, containing flammable storage cabinets was found within the FMS 7 hallway area, and is managed by FMS 7 personnel. No obvious, visible deficiencies were found within the room or storage, except that combustible and flammable items may be inadvertently stored together.
- An outdoor portable truck wash/recycling system was observed on-site, in addition to other hazardous material storage (clean and separate waste oil, clean and waste anti-freeze, etc).
 System maintenance is managed by FMS 7 personnel, and is not monitored or used by readiness center personnel.

Illuminance Levels

• The average illuminance levels in several areas throughout the facility were below the recommended values. Although the lower-than-recommended lighting levels are not expected to present an imminent hazard, safety and ergonomic improvements could result from enhanced lighting in these areas.

1.4 Recommendations

IES' recommendations resulting from this assessment, including the determination of the Risk Assessment Code (RAC) for occupational exposures, are included in a separate document entitled, "Hagerstown_RC_08_Recommendations."



2.0 OPERATION DESCRIPTION AND CONDITION

INSTALLATION: RC Army National Guard

BUILDING: 18500 Roxbury Road, Hagerstown, Maryland

LOCATION: Facility-wide

2.1 General Description and Condition

OPERATION DESCRIPTION: On the day of the assessment, IES observed routine operations in progress. Unit operations at the Hagerstown RC facility include:

- 1) <u>Headquarters and Headquarters Company (HHC)</u> for 729th Brigade Support Batallion Routine operations include administration, planning, supply, training preparation and associated training support and recruiting. The HHC operation, nor any other operation provides or utilizes the garage/vehicle maintenance facilities at this site. These are managed and operated by FMS #7. <u>The Caretaker provides minor maintenance and custodial support for this facility, but does not provide any support for HVAC service</u>. This includes cleaning interior facilities, floors and windows, minor repairs, changing light bulbs, minor floor maintenance, and outdoor grounds-keeping.
- 2) <u>Detachment 1, Military Police Platoon, Special Troops Batallion</u> Administration, planning and support for military police operations.
- 3) Family Assistance Center Support services for military families.
- 4) <u>Distance Learning Center</u> Support for professional training and troop development.
- 5) Facility Maintenance Shop Unit #7 Provides all vehicle maintenance support for the region.

NOTE: Survey assessment activities were focused primarily on RC operations. General information was collected for FMS 7 operations, since these operations are separately managed, and not part of readiness center operations.

2.2 Specific Site Survey and Conditions

Various HHC personnel provided assistance to Mr. T. Hans Derr, Senior Project Manager of IES during and subsequent to the survey period, as coordinated by Mr. Bryan Hughes, NCO of the Hagerstown RC.

CHEMICAL AND PHYSICAL AGENTS SAMPLED: During the assessment, three personal samples for airborne lead were collected. These included two samples for HHC personnel, and one sample for an FMS 7 military technician conducting vehicle repair (a.m.), and administrative duties (p.m.). All sample results were reported less than the adjusted OSHA Permissible Exposure Limit, time-weighted average (PEL-TWA) standard of $40\,\mu\text{g/m}^3$ for a 10-hour work shift (refer to Section 3.1.2). 17 surface wipe samples were collected throughout the facility, at specified or suspect areas. Certain lead dust contamination was found in the HHC supply storage area and room, and from within a filter compartment of the HVAC unit serving the Batallion Headquarters. Surface dust analysis of samples collected from the HHC lower storage level, fan/heater unit casing were reported at $220\,\mu\text{g/ft}^2$, at the HHC storage room, top of cage rail, reported at $480\,\mu\text{g/ft}^2$, and at the Batallion



Headquarters filter compartment reported at $590 \,\mu\text{g/ft}^2$ (refer to Section 3.2). These findings are anticipated to be salient conditions, and may constitute residual lead contamination related to operations during old firing range use; however, further evaluation is advised.

Facility paint was found in good condition, and no bulk samples were collected for analysis. One bulk sample for asbestos was collected of a suspect flooring material (drill floor). Sample results analysis for the suspect flooring material were reported as "no asbestos detected".

General IAQ measurements (relative humidity, carbon dioxide, carbon monoxide and temperature) were made throughout the RC facility at 28 point locations, including maintenance/garage areas, supporting indoor air quality assessment. Refer to report sections 1.3 – Key Findings and Conclusions, and 3.0 – Sample Results and Measurements for details.

VENTILATION/ HEATING, VENTILATING & AIR-CONDITIONING (HVAC) SYSTEMS: Ventilating systems were found as follows:

- o Roof HVAC equipment appeared operational. Three of five units were opened for inspection of the filter/return compartments, and sampling.
- o Within the HHC supply storage, one heater/fan unit was found non-operational (fan remained in operation with apparent "bleed-through" hot water circulation causing unnecessary heat build-up within the area.
- The Mens's locker room and fitness center exhaust/ventilation systems were found nonoperational.
- o Supply storage office, heating and air-conditioning (HAC) units (Mitsubishi), re-circulate room air only. No additional room ventilation is provided. Supply room supervisors leave doors closed to control heat infiltration, with potential CO₂ or stagnant air build-up.
- O The kitchen is equipped with an outdoor, ambient make-up air vent, to permit make-up air when the kitchen door is closed. This duct system was found open and operational. The kitchen stove and dishwasher are local exhaust-ventilated to outdoors, and were found operational.
- o The Caretaker, nor others at the facility have periodic HVAC inspection/service responsibility, and could not provide service records for review. No annual HVAC service records were available on-site, and the HVAC servicer, assigned at Pikesville Unit "Garage 13" is not readily accessible.

LIGHTING: The average illuminance levels in several areas throughout the facility were below the recommended values. Refer to Section 3.4 of this report for a summary of the lighting measurements.

WATER DAMAGE: The facility was principally free of visible water damage. Water damage was evident in the administrative area outside the NCO office. A strong odor was present on entry to the area. Personnel report the leak is long-standing and has not been satisfactorily repaired. A previous pipe or roof drain leak is evident at ceiling tile in the Batallion Headquarters. This was reportedly



repaired. There is water staining in the tectum insulation within a section of the drill hall. The Caretaker reports these conditions were prior corrected, and no further leakage is noticeable.

HOUSEKEEPING: In general housekeeping appears good at the facility. There was no significant dust build-up or unattended housekeeping conditions that can lead to safety hazards, except where noted at the HHC storage room. The supply areas/aisles were readily accessible. Current MSDSs were not found readily accessible on-site for the Caretaker and within readiness center operations.

ERGONOMICS: No inherent ergonomic hazards were noted during the survey.

FMS 7/ATTACHED GARAGE: The FMS 7 operated areas were found clean, and in good condition. No observations were noted regarding visually deficient operating conditions that could lead to health and safety hazards. The unit supervisor was not present at the site for questions.

An air sample for lead was collected for an FMS #7 technician conducting routine vehicle maintenance during the morning and administration in the afternoon. Sample results were reported as less than sample detection limits (< $3.6 \,\mu g/m^3$) for the workshift, and substantially less than the OSHA Permissible Exposure Limit, time-weighted average standard of $40 \,\mu g/m^3$ over a 10-hour work shift.

Refer to the subsequent Section 3.0 for details of all sampling conducted in the FMS 7 areas. Refer to Appendix B – Indoor Air Quality & Ventilation Sample Location Map for sample locations.

A copy of IES' field notes from this assessment is included in a separate document entitled, "Hagerstown_RC_08_Field_Notes." Please also refer to the determination of the Risk Assessment Code (RAC) for occupational exposures, included in the separate document entitled, "Hagerstown_RC_08_Recommendations."



3.0 SAMPLE RESULTS AND MEASUREMENTS

3.1 Air Sampling

3.1.1 Indoor Air Quality

Measurements of air temperature, relative humidity, and CO₂ and CO concentrations were made using a calibrated direct reading hand-held TSI Q-Trak Indoor Air Quality instrument. The carbon monoxide sample results were compared with the Threshold Limit Values (TLVs) for exposure assessment purposes. TLVs are established by the American Conference of Governmental Industrial Hygienists (ACGIH) and are published annually in ACGIH's *TLVs and BEIs*. They refer to airborne exposure concentrations and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. However, because of wide variations in individual susceptibility, a small percentage of workers may experience discomfort from or be affected by some substances at concentrations below the recommended threshold limit.⁽¹⁾

Refer to Table 1 for details of measured air temperature, relative humidity, CO₂, and CO collected throughout the building during the assessment. Refer to Appendix B - Indoor Air Quality Sample Location Map for the IAQ measurement locations throughout the facility.

TABLE 1 – AIR TEMPERATURE, RELATIVE HUMIDITY, CO₂, AND CO MEASUREMENTS

Location: Hagerstown National Guard RC, Hagerstown, Maryland

Date: July 17, 2008

Sample Location ID	Sample Location/Description	Approximate Sample Time	CO ₂ *	CO (ppm)	Temperature (°F)	Relative Humidity (%RH)
Q1	Orderly Room, central	0914	657	0.9	69	49
Q2	File Area, outside NCO Office, central	0920	608	0.3	71	48
Q3	Lounge, central	0925	591	0.5	74	61
Q4	Room 140, central	0930	673	1.1	75	52
Q5	Hallway at Distance Learning Center	0935	602	0.5	74	50
Q6	Large Classroom, central (following high occupancy)	0940	875	1.3	72	55
Q7	Batallion Headquarters, central	0945	577	0.8	73	50
Q8	Women's Locker Room, central	0950	564	0.0	77	68
Q9 (a)	Kitchen, central	0955	645	1.7	83	58
Q9 (b)	Kitchen, freezer/storage area	0957	636	0.3	87	50
Q10	Drill Room, central	1025	680	1.0	76	51
Q11	MP Supply Office, central	1030	1250	1.9	79	53
Q12	Men's Locker Room, central	1035	580	0.6	85	41
Q13	Men's Latrine, central	1040	610	0.4	80	43
Q14	Dispatch Office/Storage, central	1045	560	0.3	78	43
Q15	MP Lower Level Storage, central (bay door open)	1050	532	0.8	80	50
Q16	MP Supply Room, central	1055	560	0.9	81	48



Sample Location		Approximate	CO2*	со	Temperature	Relative Humidity
ID	Sample Location/Description	Sample Time	(ppm)	(ppm)	(°F)	(%RH)
Q17	HHC Lower Level Storage, central (heater bleed-thru)	1110	546	0.7	82	53
Q18	HHC Supply Office, central	1115	583	0.7	83	48
Q19	Caretaker's Storage, central	1125	681	0.7	81	43
Q20	Boiler Room, central	1135	586	0.8	83	55
Q21	S-4 Room, central	1145	502	0.0	69	52
Q22	FMS 7 Office, central	1155	696	1.5	75	39
Q23	FMS 7 Shop, Break Room, central (during occupancy)	1200	1130	1.6	77	40
QOUT	Outdoors, Maintenance Bay parking lot	1205	365	0.0	89	57
Q Roof	Outdoors, Roof area	1305	532	1.5	106	26
Q Roof	Outdoors, Roof area	1310	535	0.0	101	29
Q24	Fitness Center, central	1400	528	0.1	76	59
Q25	Computer/IT Office/Storage	1405	533	0.1	73	37
Q26	SPT OPS Office (Recruiter Office), central	1410	556	0.7	71	49

Notes: All areas with CO2 readings exceeding 650 occupied prior to measurement.

TABLE FOOTNOTES

Measurement device: All measurements collected in real-time using a TSI Q-Trak indoor air quality monitor, at

approximately 4 feet above ground/floor height.

ppm Parts per million contaminant in air. All CO₂ and CO concentrations expressed in ppm.

Exposure Guidelines

CO₂ Indoor CO₂ concentrations should be maintained at less than 700 ppm above outdoor air

levels - (ASHRAE 62.1-2004)(2)

CO 50 ppm (OSHA PEL-TWA); 25 ppm (ACGIH TLV-TWA)

Temperature 68 °F to 79 °F (ASHRAE 55-2004)⁽³⁾

Relative Humidity (%RH) 30% to 60% (TG 277)⁽⁴⁾

3.1.2 Airborne Lead Sampling

Air sampling and analysis for lead were conducted with reference to the National Institute for Occupational Safety and Health (NIOSH) Method 7903 – Elements, by Ion Chromatography (IC).

Air samples were collected using constant flow, personal air sampling pumps on 0.8 μ m mixed cellulose ester (MCE) membrane filters, in two-piece cassettes. All sampling pumps were calibrated before and after the sampling period with media in-line, using a primary gas flow standard per method requirements. Following the survey, the air samples and a field blanks were collected and shipped via overnight courier to AMA Analytical Services, Inc (AMA) in Lanham, Maryland, which is accredited by the American Industrial Hygiene Association (AIHA) for lead analysis. All air sample results were reported in micrograms of lead cubic meters of air sample (μ g/m³) for comparison with applicable standards of this assessment.

A summary of analysis results are subsequently presented in Table 2.

^{*} CO₂ levels exceeding 700 ppm indicate occupancy. Higher levels identified may indicate inadequate air exchange.

^{**} Radiant heat from roof likely reduce %RH in survey area. *** %RH levels > 60% may contribute to bioaerosol growth.



Refer to Appendix C for the AMA Analytical Services Inc. Laboratory Analysis Report. Worksite Sampling Data Records are included in a separate document entitled, "Hagerstown RC 08 Medical."

TABLE 2 – AIRBORNE LEAD SAMPLING RESULTS SUMMARY

Location: Hagerstown National Guard RC, Hagerstown, Maryland

Date: July 17, 2008

Sample ID	Equipment ID	Sample Description	Start Time	End Time	Sample Time (Minutes)	Avg. Flow Rate (lpm)	Air Volume (L)	Lead Sample Result (μg/m³)
H-01	IES-105	Non-Responsive 2LT Conducting routine administrative activities	08:30 13:50	12:00 15:52	332	1.97	654	< 4.6
H-04	BFE-1272- 96	Non-Responsive SSG Conducting routine administrative activities	08:33 13:16	12:00 16:35	406	1.95	792	< 3.8
H-03	IES-112	Non-Responsive Conducting vehicle maintenance (no dust) in a m., conducting admin. tasks in p m.	08:40	15:41	421	1.98	833	< 3.6

TABLE FOOTNOTES

Measurement device: MSA ELF Escort constant flow air sampling pump, with 37mm, 0.8-μm MCE filter media

Mg/m3 Milligrams per cubic meter air. Sample results expressed in milligrams contaminant per cubic meter of air.

Occupational OSHA Permissible Exposure Limit, 8-hour time-weighted average (PEL-TWA) =

Exposure Limits 0.05 mg/m³; OSHA Action Limit-TWA = 0.03 mg/m³

NOTE: Due to workshift duration of 10 hours, all sample results must be interpreted in relation to an

adjusted OSHA PEL-TWA of 40 µg/m3.

Refer to the OSHA Lead Standard at 29 CFR 1910.1025 for details of the OSHA compliance requirements.

ACGIH TLV-TWA= 0.05 mg/m³

3.2 Lead Dust Sampling

IES performed wipe sampling throughout facility areas of the readiness center and FMS 7. All wipe sampling was performed in accordance with: best Industrial Hygiene practices and the guidelines published in Section II: Chapter 2, Sampling for Surface Contamination, of the OSHA Technical Manual. The wipe samples were collected over 100 square centimeter areas using pre-wetted Ghost Wipes (Environmental Express). The wipe samples collected as a part of this assessment, along with appropriate field blanks, were shipped to AMA for analysis and were analyzed using the NIOSH 7082 flame atomic absorption spectrophotometer (FAAS) method. All wipe sample results were reported in micrograms of lead per square foot of surface sampled ($\mu g/ft^2$) for the purposes of this assessment, and for subsequent comparison with OSHA and ARNG Region North IH Office guideline criteria of 200 $\mu g/ft^2$.



A summary of analysis results are subsequently presented in Table 3 below. Refer to Appendix C for the AMA Analytical Services Inc. Laboratory Analysis Report, detailing wipe sampling results. Worksite Sampling Data Records are included in a separate document entitled, "Hagerstown_RC_08_Medical."

TABLE 3 – WIPE/BULK SAMPLE RESULTS SUMMARY

Location: Hagerstown National Guard RC (Edgar Boyd Armory), Hagerstown, Maryland

Date: July 17, 2008

Sample ID	Location	Surface Area Sampled	Lead Surface Concentration (µg/ft²)
HW-01	Roof, Computer/IT Center HVAC, return-filter compartment, settled dust	100 cm^2	200
HW-02	Roof, Large Classroom HVAC, return-filter compartment, settled dust	100 cm ²	150
HW-03	Roof, Battalion Headquarters, return-filter compartment, settled dust	100 cm^2	590
HW-04	Kitchen, Freezer Storage, top of storage cabinet, settled dust	100 cm^2	< 110
HW-05	Drill Floor/Assembly Hall, emergency exit light & basketball crank, settled dust (composite)	100 cm ²	180
HW-06	Men's Locker Room, tops of lockers, settled dust (composite)	100 cm ²	< 110
HW-07	Orderly Room, supply vents, (surface composite)	100 cm ²	< 110
HW-08	S-3 Office, supply vents, (surface composite)	100 cm ²	< 110
HW-09	Battalion Headquarters, supply vents, (surface composite)	100 cm ²	< 110
HW-10	Battalion Headquarters, return vents, (surface composite)	100 cm ²	130
HW-11	Hallway outside Recruiter's Office, top of display case, settled dust (composite)	100 cm^2	< 110
HW-12	Fitness Center, top of emergency light, settled dust	100 cm ²	< 110
HW-13	Maintenance Bay - Shop Break Room, top of storage cabinet, settled dust	100 cm^2	< 110
HW-14	HHC Supply Room, outside Office, top of cage, settled dust	100 cm ²	480
HW-15	HHC Lower Level Supply Area, Top of Cagework, abandoned ductwork interior (dust); This	100 cm^2	11,000
	area is part of the converted indoor firing range (IFR)		
HW-16	HHC Lower Level Supply Area, Top of cagework, fan-heater casing, (surface dust); This	100 cm ²	220
	area is part of the converted IFR		
HW-17	Boiler Room, Overhead abandoned ductwork, interior (dust); This area is part of the converted IFR	100 cm ²	23,000

TABLE FOOTNOTES

Collection Wipe sample collected with nitrile glove donned on hand, using "Ghost Wipe" towlette, by sequential wipe using procedure: template or best estimate of 100 cm² area; multiple passes with clean surface of wipe and subsequent folding, and

placement to a labeled, sealed plastic vial or bag.

μg/ft2: Micrograms lead per square foot. Note: laboratory converts result from μg/100 cm² to μg/ft², prior to reporting.

< 1% Pb Less than 1% lead detected in sample results.

OSHA
The USDOL/OSHA does not have a promulgated standard for lead surface contamination; however, OSHA has provided an interpretive level of 200 μg/ft² to assess the housekeeping requirement of "as free as reasonably practicable". This interpretation is presented in OSHA Industrial Hygiene Technical Manual (TED 01-00-0150;

surface 1/20/1999), and in a letter of interpretation dated 01/13/2003, and subsequently issued into public domain.

contamination by lead

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3.3 Bulk Asbestos Sampling

Ceiling plaster collected from the Women's restroom ceiling was submitted for analysis by AMA Analytical Services, a laboratory participating in the National Voluntary Laboratory Accreditation Program. Sample analysis was performed by polarized light microscopy according to USEPA method EPA/600R-93/116, with results reported as "No Asbestos Detected". Further sampling may be advised wherever major renovation or repair is completed, since plaster composition may vary depending on batch materials used.

A summary of analysis results are subsequently presented at Table 4 – Asbestos Bulk Sampling Results Summary.

Refer to Appendix C for the AMA Analytical Services Inc. Laboratory Analysis Report, detailing asbestos bulk sampling results.

TABLE 4 – ASBESTOS BULK SAMPLING RESULTS SUMMARY

Location: Hagerstown National Guard RC, Hagerstown, Maryland

Date: July 17, 2008

Sample Number	Sample Location	Sample characteristic	Result (% Asbestos)
ARNG-HG-B01	Drill Room @ HHC Supply room entry, flooring material	Flooring chip	NAD *

^{* &}quot;NAD" No asbestos detected via polarized light microscopy – Analysis Method EPQ/600/R-93/116 dated Jul 1993.

3.4 Illuminance Survey

The illumination survey was performed pursuant to best Industrial Hygiene practices and the guidelines found in the ARNG document entitled, "Evaluation of Lighting Standing Operating Procedure (SOP) and Illumination Requirements for Existing Facilities," dated November 17, 2007⁽⁵⁾; ANSI/IES documents entitled, "Office Lighting", RP-1-04, 2004 ⁽⁶⁾ and "Industrial Lighting", RP-7-01, 2001⁽⁷⁾; and the Illuminating Engineering Society of North America Lighting Handbook, 9th Ed 2000⁽⁸⁾. All measurements were made in slow response mode and were expressed in foot candles (fc). The measurements were used to calculate average illuminance levels for each workspace. Based on the activities conducted in each workspace, the calculated average illuminance level was compared to the ARNG recommended illuminance values. This report's findings are based on the illuminance readings collected during the survey, which are summarized in Table 5. The data reported in this table represent the average illuminance readings from the accessible locations of the commonly occupied work areas of the facility. Refer to the Illuminance Readings maps in Appendix D for sample locations.



TABLE 5 - ILLUMINANCE READINGS SUMMARY

Location: Hagerstown National Guard RC, Hagerstown, Maryland

Date: July 17, 2008

Sample ID	Sample Description	Average Illuminance Measurements (fc)	ARNG Recommended Illuminance Value (fc)
I1	Orderly Room (Administrative Office Block), central, on table	60	30-50
I 2	S-3 Office, adjacent to NCO Office, central, table height	26	30-50
I3	Administrative Area, outside NCO Office, central, height	11	30-50
I 4	Room 140, central, table height	61	30-50
I5	Aisleway/Corridor, outside large classroom	5	5
I6	Large Classroom, central, table height	23	30-50
I7	Battalion Headquarters, central, table height	27	30
I8	Women's Locker Room, central	48	7
I 9	Kitchen, central, table height	51	50
I10	Drill Hall/Assembly Floor, central	35	10
I11	Drill Hall/Assembly Floor, central (separate location)	24	10
I12	Men's Locker Room, central	19	7
I13	Men's Latrine, central	33	5
I14	Old Dispatch Office, central, table height	19	10
I15	HHC Supply Office, central, table height	40	30-50
I16	S-4 Office, across from Fitness Center, central, table height	66	30-50
I17	FMS 7 Office, central, table height	11	30-50
I18	FMS 7 Shop Break-room, central, table height	12	10
I19	Fitness Center, central	3	30
I20	ITC Office (storage), central, table height	20	30
I21	Recruiters Office, central, table height	16	30

Notes: All illuminance measurements and recommended values are expressed in foot candles (fc)

4.0 EQUIPMENT AND CALIBRATION DATA

4.1 Sampling Equipment List

Table 6 lists the sampling equipment that was used as a part of the assessment.



TABLE 6 – SAMPLING EQUIPMENT LIST

Equipment Type	Make/Model	Equipment/Serial Number	Equipment Identification
Personal Sampling Pump	MSA Escort ELF	IES-105	IES-105
Personal Sampling Pump	MSA Escort ELF	BFE-1272-96	IES-BFE-1272-96
Personal Sampling Pump	MSA Escort ELF	IES-112	IES-112
Bios Dry Cal Calibrator	Bios DCL-MH	101784	101784
Light Meter	International Light, IL1400A, illum. probe	3206/1782	R2373/3691
Indoor Air Quality Monitor	TSI Model 8554 Q-Trak	02071015	R10120
Velocity Meter	TSI VelociCheck, 8340	00100195	00100195

4.2 Sampling Equipment Calibration Data

Table 7 details the calibration data for each piece of sampling equipment used during the assessment.

TABLE 7 – SAMPLING EQUIPMENT CALIBRATION DATA

Equipment ID	Calibrator Used	Date of Pre- Sampling Calibration	Pre- Sampling Calibration Value (lpm)	Date of Post- Sampling Calibration	Post- Sampling Calibration Value (lpm)	Average Calibration Value (lpm)
IES-105	101784	7/16/08	2.02	7/16/08	1.96	1.99
IES-BFE-1272-96	101784	7/16/08	1.98	7/16/08	1.96	1.97
IES-112	101784	7/16/08	2.01	7/16/08	1.96	1.98

5.0 REFERENCES

- 1. ACGIH. 2008 TLVs and BEIs.
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), Standard 62.1-2007, "Ventilation for Acceptable Indoor Air Quality," ASHRAE, Atlanta, Georgia, 2007.
- 3. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), Standard 55-2004, "Thermal Environmental Conditions for Human Occupancy," ASHRAE, Atlanta, Georgia, 2004.
- 4. Technical Guide 277, "Army Facilities Management Information Document on Mold Remediation"
- 5. "Evaluation of Lighting Standing Operating Procedure (SOP) and Illumination Requirements for Existing Facilities," ARNG, 17 November 2007.
- 6. Office Lighting, ANSI/IES RP-1-04, 2004 (Pg. #'s 61 63).
- 7. Industrial Lighting, ANSI/IES RP-7-01, 2001. (Pg. #'s 3 5 and 51 63)
- 8. Lighting Handbook, Illuminating Engineering Society of North America, 9th Ed 2000 (Chapter 10, Interior plates 1, 5, and 6 and page 20-13)





APPENDIX A READINESS CENTER PHOTOGRAPHS





Photograph #1 – RC Drill Hall



Photograph #2 – Drill Hall, Tectum Ceiling Material, apparent water staining





Photograph #3 – Roof-mounted Package HVAC unit, intake area



Photograph #4 – Roof-mounted Package HVAC unit, intake area, pooled water





Photograph #5 – Roof, View of package HVAC units



Photograph #6 – Men's Locker Room, HVAC unit at ceiling





Photograph #7 – HHC Lower Level Supply Storage, questionable equipment in storage



Photography #8 – Military Police Area Vault, questionable materials stored in vault





Photograph #9 – HHC Lower Level Storage – Abandoned duct from old firing range (rear wall of photo)



Photograph #10 – Boiler Room – Abandoned duct from old firing range (currently separated from HHC Lower Level Storage by block wall)





Photograph #11 – Administrative Area outside NCO Office, continuing water leak



Photograph #12 – Caretaker's Office, Washing Machine



APPENDIX B INDOOR AIR QUALITY MAP

1

INDOOR AL QUALITY SAMPLE LOCATION S

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APPENDIX C LABORATORY ANALYSIS RESULTS

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Client: National Guard Bureau Job Name: NATL Guard Bureau Chain Of Custody:

State Military Reservation 301-IH Old Bay Lane, Attn: NGB-AVN-SI, Job Location: Not Provided

Address:

Attention:

P.O. Number: Job Number: Not Provided EHS 08794.02

Havre de Grace, Maryland 21078

503005

7/29/2008

NY EL

Date Submitted:

Date Analyzed: Person Submitting:

8/5/2008

Report Date:

8/8/2008

FOIA Requested Record #5 5-0085 (MD) / Released by National Guard Bureau Page 3593 of 5269

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft³)	Reporting Limit	!	Final Result	:
:							•		
0873873	H-01	Flame	Air	654	N/A		nn' ^	4.6	ug/m³
0873874	H-03	Flame	Air	833	N/A		±	3.6	ug/m³
0873875	H-04	Flame	Air	792	N/A		an,	3.8	ug/m³
0873876	H-02	Flame	Air Blank	0	N/A		¥.	ديئ	æ
0873877	10-WH	Flame	Wipe	**	0.108		1 .	200	ug/ft²
0873878	HW-02	Flame	Wipe	***	0.108	111.52 ug/fi ²	F2	150	ug/ſt²
0871970	HW-03	Flamo	Wina	***	0.100		,	* 000	

Λ Λ Λ	ug/ft² ug/ft² ug/ft²	, , , , , , , ,	111.52 111.52 111.52	0.108	: : :	Wipe Wipe	Flame Flame Flame	HW-13	0873887 0873888 0873888
A A A	ng/ft: ng/ft: ng/ft:		111.52 111.52 111.52	0.108 0.108	* * * * * * * * * * * * * * * * * * *	Wipe Wipe Wipe	Flame Flame Flame	HW-07 HW-08 HW-09	0873883 0873884 0873885 0873886
۸ ۸	mg/ts: mg/ts: mg/ts:		111.52 111.52 111.52	0.108 0.108 0.108	* * * * * * * * * * * * * * * * * * * *	Wipe Wipe Wipe	Flame Flame Flame	HW-03 HW-04 HW-05	0873879 0873880 0873881 0873882
^	ng/tt² ug/tt²		3.00 111.52 111.52	0.108 0.108	* * 0	Air Blank Wipe Wipe	Flame Flame Flame	H-02 HW-01 HW-02	0873876 0873877 0873878
Λ Λ	ug/m³ ug/m³		3.60 3.79	N/A N/A	833 792	Air Air	Plame Flame	H-03 H-04	0873874 0873875
٨	ug/m³		4.59	N/A	654	Air	Flame	H-01	0873873

An A1HA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Address: Client State Military Reservation 301-IH Old Bay Lane, Attn: NGB-AVN-SI, National Guard Bureau Havre de Grace, Maryland 21078 Job Location: Job Name: Job Number: EHS 08794.02 Not Provided NATL Guard Bureau Date Submitted: Chain Of Custody:

P.O. Number:

Not Provided

Date Analyzed: Person Submitting: 8/5/2008 7/29/2008

503005

Report Date:

8/8/2008

FOIA Requested Record #5-0085 (MD)
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Summary of Atomic Absorption Analysis for Lead

Attention:

control samples	or quality	see GC summary for analytical results of quality control samples associated with these sampes.	associated with these sampes.	associate	Vater: SM-3113B	93/200(M)-7421; \	Solids: EPA 600/R-93/Z	s, Paints, and Soil/S	Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Soilds: EPA 600/R-93/200(M)-7420, Water: SM-3111B	Analysis Method F
air filler	•		,			7470 141-1-	T	Thinks and the store	Flomo: Air Winos	Analysis Mashad &
Microvac samples collected on MCE 37mm	ug/fì²	23000	ug/ft²	37.17	0.108	**	Wipe	Flame	HW-17	0873893
Microvac samples collected on MCE 37mm air filter	ug/Îl²	220	ug/ft²	37.17	0.108	* * *	Wipe	Flame	HW-16	0873892
Microvac samples collected on MCE 37mm air filter	ug/ft²	11000	ug/ft²	37.17	0.108	***	Wipe	Flame	HW-15	0873891
Microvac samples collected on MCE 37mm air filter	ug/ft²	480	ug/ft²	37.17	0.108	等等等	Wipe	Flame	HW-14	0873890
Comments		Final Result	Reporting	Rep	Area Wiped (ft²)	Air Volume (L)	Sample Type	Analysis Type	Client Sample Number	AMA Sample Number

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Analysis Method For Furnace: Air, Wippes, Plantis, and Sol/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B association applies only to paint chip, wipe, and water of samples.

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the results.

Air and Wipe results are not corrected for any blank results.

Air and Wipe results are not corrected for any blank results of the quality or condition that it is not to be used, in whole or in part, in any advertising or jubilicity matter without prior written authorization from us. Sample specifical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report applies only to the sample, or samples, investigated and upon the condition that it is not to be used, in whole or in part, in any advertising or jubilicity matter without prior written authorization from us. Sample types, or a sample specifical or similar products. As a mutual protection to clients, this report applies only to the sample, or samples, investigated and upon the condition that it is not to be used, in whole or in part, in any advertising or jubilicity matter without prior written authorization from us. Sample types, or a position of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or jubilicity for the accuracy and completenesses.

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transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NYLAP, NIST, or any agency of the Federal Government. All rights reserved this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of balk samples and

WWW.amalab.com BILL THE NATIONAL GUARD BURDAN RECIDO ZORTH TH OTTICE DIRECTO	AMA Analytical Services, Inc. AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) 4475 Forbes Blvd. • Lanham, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643
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May, 2018

7 Mailing/Billing Information: ☐ Immediate きしい PCM_Air -- Please Indicate Filter Type: ☐ 24 Hours Asbestos Analysis おれる。ま・ ₹ . HW-17 ENLAir - Please Indicate Filter Type: Comments \$ 5 をエ たっさ Te la TEV OF LABORATORY STAFF ONLY: (CUSTODY) Client Name HAS TIKETY Phone # Address 3: Address 2: Other (specify) ☐ EPA Point Count. PC MCE Possity in a 25mm 37mm Address 1: Grav. Reduction ELAP 198.6. ■ NY State Friable 198.1 GPA 600 Visual Estimate TQ - BO1 Octu ■ Other (specify) L NIOSH 7402 PC MCE Porosity → Fiberglass _ J AHERA J NIOSH 7400 AFTER HOURS (must be pre-scheduled) www.amalab.com CLIENTE (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643 4475 Forbes Blvd. • Lunham, MD 20706 AIIIA (#100470) NVLAP (#101143-0) NY ELAP (10920) AMA Analytical Services, Inc. CONTACT 3. Results Reported To: Date/Time Analyzed: L. Date/Time RCVD: Time Duc: Date Due: 1720 BLUE BELL 8 SAMPLE INFORMATION \ \ \ \ \ (YTO) **S**2 SAMPLE LOCATION/ IDENTIFICATION in a 25mm 37mm BILL THE NATIONAL GUARD BURGAN RECEDS ZORTH IH OTTELL (OTY) QTY) ١, MALTON RD TIQTE **≯** THE THE <u> (</u>QTY) CYTON____ LOTY P Fax # Ţ ☐ Immediate ☐ Next Day ☐ 2 Day **HMOVIOA** 1.1185 immediate Reporting Information (Results will be provided as soon as technically feasible): MUTAPA/AMA ANALYTICAL STRUCTURS, HIT 2245 6 inoc. ۹ WIPE AREA IEM Willer EM Dust EM Bulk (TEM Water samples___ All samples received in good condition unless otherwise noted. ☐ ELAP 198.2/EPA 100.2 Quan. (s/mearDust DG480-49) LI NY State PLM/TEM. Residual Ash Qual. (pres/abs). 🚨 Quart. (s/area) Vacuum D5755-95 Qual. (pres/abs) Vacuum/Dust HEAP 198,4/Chatfield CHAIN OF CUSTODY V_E ☐ 3 Day ☐ 5 Day + Date Due rem By (Print) NORMAL BUSINESS HOURS MICKE NATASIS ¥. ٦ + Submitted by Contact Persu Job# Job Name: LE4D Job Location: (YIO) By (Print) QTY Mol_D Results Required By Noon g 013 Date: (S) Made to Accomodate) 41R EveryAttempt Will Be NATIL GUARD 5 00794 013 BUK3 013 DUST NATRIX Sign WAP Mold - Direct Microscopic Analysis .ead Analysis TAPE ☐ Surface Souts. ☐ Surface Tape. 🗅 Dust Wipe beonuce (wipe type Ĺ Waste Water ☐ Spore-Trap Drinking Woler ☐ Soit/Softi Dust Wipe respective ■ Paint Chip... MASSING PO. # w_{AB} (Please Refer To This Time Number For Inquires: Datefline DateCline Date/Time Sign. (QTY) \(\begin{align*} \delta \text{surface Vacuum Dust} \) . (2.73) ēD. HABORATORY STATE ONLY 27 WON. _(QFY) -(C) [7] SEPORT TO: CLIENT CONTACT <u>ا</u> CONTRACT Contact Contact -828 Initials . (QTY) 3078 DE CO OTY .₹ 3 Y.O.Y ã ĝ Requested Record #J-15-0085 (MD) **BEST AVAILABLE COPY** Posted to NGB FOIA Reading Room **FOIA**

May, 2018

Released by National Guard Bureau

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



Client:

National Guard Bureau

Job Name:

NATL Guard Bureau

Chain Of Custody:

503005

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Not Provided

Date Analyzed:

8/5/2008

State Military Reservation

Havre de Grace, Maryland 21078

Job Number:

P.O. Number:

EHS 08794.02

Not Provided

Person Submitting:



Attention:



Summary of Polarized Light Microscopy

Page 1 of 1

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	_	Asbestos	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0873894	ARNG-HG- B01	NAD		 		 	TR			100	Beige	Homogeneous	LBP	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- TEM RECOMMENDATION Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- MATRIX REDUCTION RECOMMENDATION Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

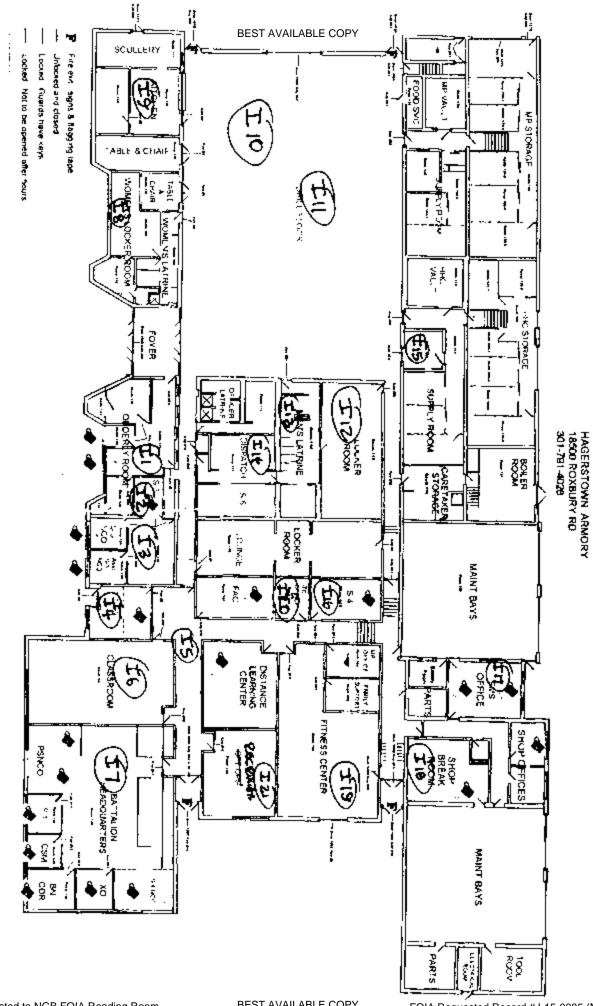
Uncertainty: For samples containing asbestos in range of 1-10% the CV is 0.43, 11-35% CV=0.55, >35 CV=0.23

om Butuk

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.



APPENDIX D ILLUMINANCE READING MAP



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National Guard Region North

National Guard Readiness Center Industrial Hygiene Evaluation Hagerstown Army National Guard Armory Hagerstown, MD 21740-9538

Prepared for:

National Guard Region North Industrial Hygiene Office 301 Old Bay Lane Havre De Grace, MD 21078

Attn:

Non-Responsive

Prepared by:

Bonus Environmental, LLC P.O. Box 121 Mt. Pleasant, Michigan 48804

> Project No. 1061-03 August 4, 2010

Bonus Environmental, LLC

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APPENDICES

Appendix A Shop Diagram

Appendix B Lead Sample Results

Appendix C Photographs

Appendix D References



August 4, 2010 Project No. 1061-03

National Guard Region North Industrial Hygiene Office 301 Old Bay Lane Havre De Grace, MD 21078-4003

Attn: Non-Responsive

Project: Army National Guard Readiness Center, Industrial Hygiene Evaluation

Hagerstown Army National Guard Armory

1.0 - EXECUTIVE SUMMARY

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North to identify and measure the existence and extent of potentially hazardous operations or conditions at the Hagerstown Army National Guard Readiness Center located at 18500 Roxbury Road in Hagerstown, Maryland. The purpose of this evaluation was to generate or to update a previous baseline evaluation so that employee exposure history can be provided to each civilian and military employee. The following industrial hygiene and safety programs were evaluated during this industrial hygiene evaluation performed by Bonus Environmental, LLC representative Jeff Walworth on May 19, 2010:

- Indoor Air Quality
- Use of items on the Hazardous Materials List
- Vehicle maintenance activities
- Lead Wipe & Air Sampling
- Illumination

- Ergonomics
- Evaluation of the physical condition of the facility in regards to peeling paint, asbestos containing materials, water damage or mold problems, and housekeeping practices.

The Hagerstown Readiness Center is an Army National Guard armory comprised of offices, a drill hall, a kitchen, a former indoor firing range, an attached maintenance garage, a fitness room, supply rooms, a boiler room, a battery room, locker rooms, classrooms, a break room, and a lounge. The point of contact for this facility was MSG Curtis Shank. Nine (9) full-time administrative personnel and five (5) full-time maintenance personnel are employed in the approximately 31,800 ft² facility. A shop diagram depicting the locations of the operations identified during this industrial hygiene evaluation is attached to this report as Appendix A.

The National Guard Bureau Region North Industrial Hygiene Office provided governmental furnished equipment and sampling media required to perform the industrial hygiene evaluation. Chain of custody forms for laboratories approved by the National Guard Bureau Region North Industrial Hygiene Office were provided with the sampling media. All samples collected during this industrial



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hygiene evaluation were sent to the National Guard Bureau Region North Industrial Hygiene Office approved laboratories for analysis.

2.0 – LEAD SAMPLING

2.1 – Lead Wipe Sampling

Lead wipe sampling was performed according to the EPA method 600/R-93/200(M)-7420 (Atomic Absorption - Flame). Twenty (20) wipe samples and one (1) field blank were sent under chain-of-custody procedures to AMA Analytical Services, Inc., an AIHA accredited laboratory located in Lanham, Maryland. The National Guard Bureau Region North Industrial Hygiene Office has established/interpreted a threshold of $200~\mu g/ft^2$ of lead concentration for surface cleanliness. The following table outlines the locations and analytical results for the lead wipe samples collected during this project:

		Army National Guard - Hagerstown Readiness Cente	r	
		Lead Wipe Sample Results		
Sample #	Sample Date	Sample Location	Sample Area (ft²)	Sample Result (µg/ft²)
H-W-1	5-19-10	Field Blank		< 12
H-W-2	5-19-10	Drill hall, NE corner, top of basketball hoop lifting device	0.111	< 110
H-W-3	5-19-10	Drill hall, NW corner, top of locker #25	0.111	260
H-W-4	5-19-10	Drill hall, SW corner, top of file cabinet	0.111	< 110
H-W-5	5-19-10	Drill hall, floor, east side "free throw" line	0.111	< 110
H-W-6	5-19-10	Drill hall, floor, west side "free throw" line	0.111	< 110
H-W-7	5-19-10	West LRS supply storage (former indoor firing range), floor	0.111	< 110
H-W-8	5-19-10	West LRS supply storage (former indoor firing range), overhead heater	0.111	10,000
H-W-9	5-19-10	West LRS supply storage (former indoor firing range), NE corner, light fixture	0.111	< 110
H-W-10	5-19-10	West LRS supply storage (former indoor firing range), NE corner, ventilation duct grill	0.111	< 110
H-W-11	5-19-10	West LRS supply storage (former indoor firing range), top of inflatable raft stored on top of cage	0.111	< 110
H-W-12	5-19-10	Supply office (outside of former indoor firing range), on top of television	0.111	< 110
H-W-13	5-19-10	Kitchen, top of mixing machine	0.111	< 110
H-W-14	5-19-10	Recruiting office, east side, top of bookshelf	0.111	< 110
H-W-15	5-19-10	Classroom 141, east side-center of room, surface of desk	0.111	< 110
H-W-16	5-19-10	Room S-3, NW corner, top of file cabinet	0.111	< 110



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		Army National Guard - Hagerstown Readiness Cente	r	
		Lead Wipe Sample Results		
Sample #	Sample Date	Sample Location	Sample Area (ft²)	Sample Result (µg/ft²)
H-W-17	5-19-10	Room 156, fitness center, top of DVD player	0.111	< 110
H-W-18	5-19-10	East maintenance garage, along south wall, surface of workbench	0.111	130
H-W-19	5-19-10	Shop break room, along west wall, top of printer	0.111	< 110
H-W-20	5-19-10	Battery room, top surface of ventilation hood	0.111	180
H-W-21	5-19-10	West maintenance garage, center of room, top of toolbox	0.111	< 110

Surface cleanliness threshold = $< 200 \mu g/ft^2$

2.2 - Lead Air Sampling

The purpose of lead air monitoring was to document task-specific activities and corresponding exposures to lead. Occupational Safety and Health Administration (OSHA) 29 CFR 1926.62 requires employers whose employees are exposed to lead in the work place, in any quantity, make a determination whether any employee's exposure exceeds the action level (AL) of 30 μ g/m³ or the maximum permissible exposure limit (PEL) of 50 μ g/m³ as 8-hour time weighted averages (TWAs). If employee exposures are less than 30 μ g/m³, training is required under the Hazard Communication 29 CFR 1926.59. Exposures that exceed the AL or PEL require the employer to comply with additional requirements, including air monitoring, additional training, and restricted work practices as outlined in OSHA 29 CFR 1926.62.

Representative fixed area sampling was conducted for potential airborne concentrations of lead in accordance with accepted Industrial Hygiene methods recognized by the National Institute for Occupational Safety and Health (NIOSH) and OSHA. Representative breathing zone samples were not collected from an employee performing administrative tasks.

Lead exposure monitoring was performed in accordance with the EPA method 600/R-93/200(M)-7420 (Atomic Absorption - Flame) with SKC personal air sampling pumps calibrated to 2.0 liters per minute. All samples were collected on 37 mm diameter cassettes with mixed-cellulose ester filters. All sampling pumps were calibrated before and after each use to ensure volume accuracy. Two (2) samples and one (1) field blank were sent under chain-of-custody procedures to AMA Analytical Services, Inc., an AIHA accredited laboratory located in Lanham, Maryland. Analytical results of the lead wipe and air samples are attached to this report as Appendix B.



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		Army National Guard - Lead Air	_			ess Cen	ter		
Sample #	Sample Type	Sample Location	Flow Rate	Start	Stop	Vol.	Reprt. Limit (μg/m³)	Results (μg/m³)	8 hr TWA (μg/m³)
May 19	, 2010		-		_				
H-A-1	FB	Field Blank				0	3	< 3	N/A
H-A-2	IWA	West maintenance garage, east side bay	2.0	0813	1524	862	3.5	< 3.5	N/A
H-A-3	IWA	Room S-3, MSGT	2.0	0820	1527	854	3.5	< 3.5	N/A

PS = Personal sample, **IWA** = Inside work area, **N/A** = Not Applicable **Note**: The OSHA PEL of $50 \mu g/m^3$ is averaged over an 8 hr work shift

3.0 - PHYSICAL CONDITION OF FACILITY / PERSONNEL CONCERNS

3.1 - Lead Based Paint

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC performed a visual inspection of the facility in regards to lead based paint. Bonus Environmental, LLC identified no areas of peeling paint which could potentially pose a lead exposure hazard.

LeadCheckTM, ChromateCheckTM, NickelCheckTM, and CadmiumCheckTM swabs were utilized as a screening method on a horizontal table that has been used during welding activities in the past. Metal-specific swabs were used to test for the presence of cadmium, chromate, lead, and nickel. All swabs gave a negative indication for the given metal contaminant.

3.2 - Presumed Asbestos Containing Materials

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC performed a visual inspection to identify presumed asbestos containing materials (PACM) and, if found, to note their condition. Bonus Environmental, LLC did not identify any PACM that was considered to be in poor or damaged condition.

3.3 - Water Damage/Mold Growth

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC performed a visual inspection to report the location and perform an evaluation of any water damaged or visible mold problems. Water-stained ceiling tiles were seen in Battalion Headquarters, Room S-3/153, and in the hallway outside of FMS 7 area.

3.4 - Housekeeping

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC performed an evaluation of the housekeeping practices. Bonus Environmental, LLC found the housekeeping to generally be good, with the exception of the west maintenance garage, where numerous cords were laid or stretched across the floor, oil absorbent



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covered a large area of the floor, and tires were erratically stacked against an emergency eye wash station.

3.5 – Employee Interviews

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC performed interviews and made observations to determine if the work activities being performed possessed any concerns. Following the interviews and observations, no ergonomic and or indoor air quality concerns were identified.

3.6 – Indoor Air Quality

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC measured temperature, relative humidity, carbon monoxide (CO), and carbon dioxide (CO₂) throughout the facility. A calibrated TSI Q-Trak Model 7565 Indoor Air Quality Monitor equipped with a Q-Trak Probe 982 was utilized to record indoor air quality measurements.

Carbon dioxide is a natural component of air and the amount of CO₂ in a given air sample is commonly expressed as parts per million (ppm). The outdoor air in most locations contains about 380 ppm carbon dioxide. Higher outdoor CO₂ concentrations can be found near vehicle traffic areas, industry and sources of combustion. The concentrations of CO₂ found in most offices are well below the OSHA Permissible Exposure Limit (PEL) of 5,000 ppm when averaged over an 8-hour time period for an industrial workplace. While levels below 5,000 ppm are considered to pose no serious health threat, studies have indicated that individuals in offices with elevated CO₂ concentrations tend to report drowsiness, lethargy and a general sense that the air is stale. Ventilation rates for office spaces are defined by various codes and standards. The most widely accepted standard is the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62. According to ASHRAE Standard 62.1-2007, CO₂ concentrations below 700 ppm above the outdoor level are considered to indicate adequate ventilation and provide human comfort. The CO₂ measurements collected during this industrial hygiene evaluation ranged from 412 ppm to 896 ppm and indicate adequate ventilation within the facility.

Carbon monoxide, also known as the "silent killer," is a colorless, odorless, poisonous gas that results from the incomplete burning of common fuels such as natural or liquefied petroleum gas, oil, wood or coal. When carbon monoxide is inhaled, it enters the blood stream and reduces the ability of the blood to carry oxygen to vital organs, such as the heart and brain. Because it is impossible to see, taste or smell the toxic fumes, CO can harm you before you are aware it is in your work area. At lower levels of exposure, CO causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea and fatigue. The effects of CO exposure can vary greatly from person to person depending on age, overall health and the concentration and length of exposure. The OSHA has established a PEL of 50 ppm. OSHA standards prohibit worker exposure to more than 50 parts of the gas per million parts of air averaged during an 8-hour time period. The peak CO level for employees is 200 ppm. The CO measurements collected during this industrial hygiene evaluation ranged from 0.5 ppm to 1.4 ppm. CO levels were well below the OSHA PEL during this industrial hygiene evaluation.



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During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC collected temperature measurements. Temperature measurements throughout the facility ranged from 65.3°F to 69.1°F and are considered to be within an acceptable range.

During the industrial hygiene evaluation of the Army National Guard Hagerstown Readiness Center, Bonus Environmental, LLC collected relative humidity measurements. Relative humidity measurements throughout the facility ranged from 49.9% to 61.3% and are considered to be within an acceptable range. Indoor air quality measurements recorded during this industrial hygiene evaluation are summarized in the table below.

Army National Gu Indoor A	ard - Hagerstov Air Quality Mea		Center	
Location	CO ₂ (ppm)	CO (ppm)	Relative Humidity (%)	Temperature (°F)
Outdoors, south side entrance	407	2.2	68.8	58.2
Room 109, Kitchen	887	0.5	61.3	65.3
Drill hall, center of room	896	0.7	57.4	67.1
Recruiting office	603	0.6	54.4	67.7
Room 150, men's locker room/lounge	564	0.8	49.9	68.7
Classroom 141	440	1.0	51.2	68.6
Room 156. Fitness center	507	0.5	50.5	69.1
Shop break room	412	0.9	52.5	67.6
Center of west maintenance garage	686	1.4	55.2	66.8
Boiler room	519	1.1	57.5	66.7
East supply room	797	0.9	54.3	67.8

Required/Recommended Values

CO₂ - OSHA PEL = 5,000 ppm and ASHRAE Standard 62.1-2007 = no greater than 700 ppm above outdoor

CO - OSHA PEL = 50 ppm and OSHA Ceiling Limit = 200 ppm

Temperature - ASHRAE Standard 55-2004 = between approximately 67 and 82 °F.

RH – ANSI/ASHRAE Standard 62.1-2007 = <65%

4.0 – LIGHTING

Utilizing a properly calibrated Cooke Corporation cal-Light 400 light meter, Bonus Environmental, LLC collected illumination readings throughout the facility. Illumination measurements recorded during this industrial hygiene evaluation are summarized in the table below.

Army National Guard - Ligh	- Hagerstown Read hting Survey	iness Center	
Location	Measurement in Foot Candles	Requirement in Foot Candles	Requirement Met?
Room S-3 – Office	46.2	50	NO
Center of Battalion Headquarters	88.7	50	YES
Room S-1 XO – Office	82.1	50	YES
Room S-1 NCO – Office	86.4	50	YES
Classroom 141	47.7	30	YES



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•	ard - Hagerstown Read Lighting Survey	diness Center	
Location	Measurement in Foot Candles	Requirement in Foot Candles	Requirement Met?
Family support office	82.8	50	YES
Recruiting office	77.8	50	YES
LRS office	70.7	50	YES
Entrance foyer	37.3	5	YES
Women's latrine	115.3	5	YES
Room 105 – Women's locker room	82.8	7	YES
Room 108 – "tables & chairs" – Storage	25.9	30	NO
Room 109 – Kitchen	110.7	10	YES
Room 110 – Kitchen storage	138.8	30	YES
Drill hall, center of room	29.1	30	NO
Room 151 – Training/FAC	63.4	30	YES
Room 150 – Men's locker room/lounge	28.6	7	YES
Room 113 – Supply	77.9	30	YES
Men's officer latrine/locker room	173.7	7	YES
Men's latrine	64.0	5	YES
Locker room	51.7	7	YES
Room 153/S-4 – Storage	42.6	30	YES
Server/ITC room	47.4	30	YES
Room 157, DLC classroom	40.6	30	YES
Room 156 – Fitness center	25.3	30	NO
Room 154, MP office	69.9	50	YES
Hallway outside of room 159	19.4	5	YES
East maintenance garage, locker room	61.1	7	YES
FMS 7 tool room	15.1	30	NO
Center of east maintenance garage	18.1	75	NO
Shop break room	36.8	10	YES
Room 163, shop office	52.8	50	YES
FMS office/parts storage	89.9	30	YES
Battery room	77.2	30	YES
Center of west maintenance garage	57.6	75	NO
Parts room	160.6	30	YES
Caretaker/Storage room	11.3	30	NO
Boiler room	14.2	30	NO
East Supply room	52.3	30	YES
East Supply room East Supply office	80.1	50	YES
East LRS storage	13.5	30	NO
East LRS storage West Supply room	127.1	30	YES
West Supply room West Supply office	42.0	50	NO
West LRS storage	12.2	30	NO
Family support storage	12.2	Inaccessible	NO
		Inaccessible	
Room 155, Family support office Room 164, shop office		Inaccessible	
, 1			
Vault #1		Inaccessible Inaccessible	



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Lighting levels were compared to the levels outlined within the ANSI/IESNA RP-1-04 Office Lighting Handbook, and the ANSI/IESI RP-7-01 Lighting Industrial Facilities Handbook. Areas within the facility which did not meet the foot candle requirements are identified with a "NO" within the Requirement Met? column. It is recommended that illumination be improved in all the areas that did not meet the requirements. Improving illumination can be achieved by replacing burned-out lamps/bulbs, cleaning fixtures, relocating detailed work activities to more illuminated areas, and using supplemental task lighting.

5.0 – EVALUATION OF ATTACHED GARAGE

5.1 – Operational Description - Readiness Center

Nine (9) administrative and five (5) maintenance personnel are assigned to the Hagerstown Readiness Center to provide space for units to support and train soldiers. Vehicle maintenance typically occurs during the normal work hours of Monday-Friday, 0630-1700. The attached garages include four bays, all of which include vehicle exhaust ventilation. Personal protective equipment including leather gloves, nitrile gloves, ear plugs, and safety glasses are available to all employees who work within the attached garage. Activities conducted on the day of the IH evaluation included engine and brake repairs.

5.2 – Local Exhaust Ventilation System

Exhaust ventilation systems were identified in the Hagerstown Readiness Center facility during the industrial hygiene evaluation. The ventilation system consisted of a central exhaust fan and series of flexible trunks of ductwork. The central exhaust fan was centrally located and exhausted directly to the outdoors through the ceiling. The exhaust ventilation system was installed for the purpose of removing diesel exhaust fumes. A TSI VelociCalc 9555 Multiparameter Ventilation Monitor was utilized to collect multiple measurements of the face velocity of each flexible trunk of ductwork. The table below details the results of the ventilation system evaluation in the Hagerstown Readiness Center facility.

· · · · · · · · · · · · · · · · · · ·	l Guard - Hagers haust - Ventilation			
Location	Measured Average Face Velocity (fpm)	Calculated Volumetric Flow (cfm)	Area of the Opening (ft²)	Sufficient Air Flow
East garage, north duct	1250	425	0.34	NO
East garage, south duct	1213	412	0.34	NO
West garage, north duct	670	228	0.34	NO
West garage, south duct	652	222	0.34	NO

cfm = cubic feet per minute, calculated by multiplying the measured face velocity by the area of the opening, **fpm** = feet per minute, **calculated reference value** = 1,781 acfm

Figure VS-85-02 on page 13-151 of the ACGIH "A Manual of Recommended Practice for Design, 26th Edition" specifies that tailpipe exhaust ventilation volumes for operating engines connected directly to a tailpipe exhaust system are to be determined by the engine displacement, the engine RPM, and tailpipe exhaust temperature, plus a 20% safety factor. The largest types of vehicles serviced



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within the Maintenance garages are M925 5-ton cargo trucks equipped with a Cummins NHC-250 14.0 liter diesel engine which operates at 2,100 RPM. Based on an average tailpipe temperature of 300°F, the minimum required volume flow rate of the overhead exhaust system used to control emissions from the fumes of diesel exhaust was calculated to be 1,781 acfm (actual cubic feet per minute). The representative exhaust duct systems tested in the Hagerstown Readiness Center facility did not provide sufficient air flow.

6.0 – BATTERY ROOM

Mechanics from the Maintenance garages work within the Battery room on an as needed basis. The Battery room is used for storage and charging of batteries. Batteries in need of repair are shipped to another facility. Personal protective equipment including a rubber apron, nitrile gloves, eye goggles, safety shoes, and face shield are available to all employees who work within the Battery room. No work activities were being performed within the Battery room during the industrial hygiene evaluation.

Lead acid batteries produce hydrogen gas and other fumes at 80% recharge point, making proper ventilation in the battery charging area extremely important. Hydrogen gas is not only colorless and odorless, but is lighter than air, causing the gas to rise to the top of a building. For safety purposes, the concentration of hydrogen in the air should be kept below 1% to reduce risk of explosion. An evaluation of the ventilation system within the Battery Shop was performed during this industrial hygiene evaluation of the facility. The Battery Shop is used as a place of storage and charging of lead-acid batteries. Thirty four (34) 6-cell (120 amps-hour capacity) batteries were located in the battery room, with eleven (11) of them on chargers. A vent hood, located on the east side of the room approximately 7' above the floor, provides ventilation to the room. The vent hood has an opening measuring 12"x 12". A TSI VelociCalc 9555 Multiparameter Ventilation Monitor was utilized to measure the face velocity at the ventilation hood. Measurements indicated that the exhaust fan provides an average volumetric flow rate of 367 fpm. The entry door to the Battery Shop is grilled to provide make-up air. The ventilation rate of the exhaust system required within the Battery Shop was calculated with the following formula.

 $Q = 0.054 \times I \times N$ where,

- Q = required ventilation rate, cfm
- I = 0.21 x (capacity of largest battery to be charged in amp-hours) or 0.25 x (maximum obtainable amps from charger), whichever is greater
- N = number of batteries to be charged at one time x number of cells per battery

In this case, the required ventilation of the exhaust system (Q) within the Battery Shop was determined to be 90 cfm, where I=0.21 x 120, N=11 x 6. The ventilation rate of the exhaust system in place within the Battery Shop was determined to be 367 cfm.

7.0 - CONCLUSION

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North to identify and measure the existence and extent of potentially hazardous operations or conditions at the Hagerstown Army National Guard Readiness Center located at 18500 Roxbury Road in Hagerstown,



August 4, 2010 Page 10

Maryland. The purpose of this evaluation was to generate or to update a previous baseline evaluation so that employee exposure history can be provided to each civilian and military employee. An industrial hygiene evaluation of the facility was performed by Bonus Environmental, LLC representative Non-Responsive on May 19, 2010:

Bonus Environmental, LLC recommends that any areas of concerns outlined within this report be evaluated to ensure the necessary actions are made. Following the completion of the industrial hygiene evaluation, Bonus Environmental, LLC found the following safety and/or indoor air quality conditions of the facility to be within acceptable levels/condition in regards to the following:

- · Carbon Dioxide
- Carbon Monoxide
- Lead Air Samples
- Ergonomics

- Presumed Asbestos Containing Materials
- Temperature
- Relative Humidity

It has been a pleasure to be of assistance to you. Please contact us if you have any questions concerning this report or if we can be of any further assistance in any other environmental or occupational health matter.

Sincerely,



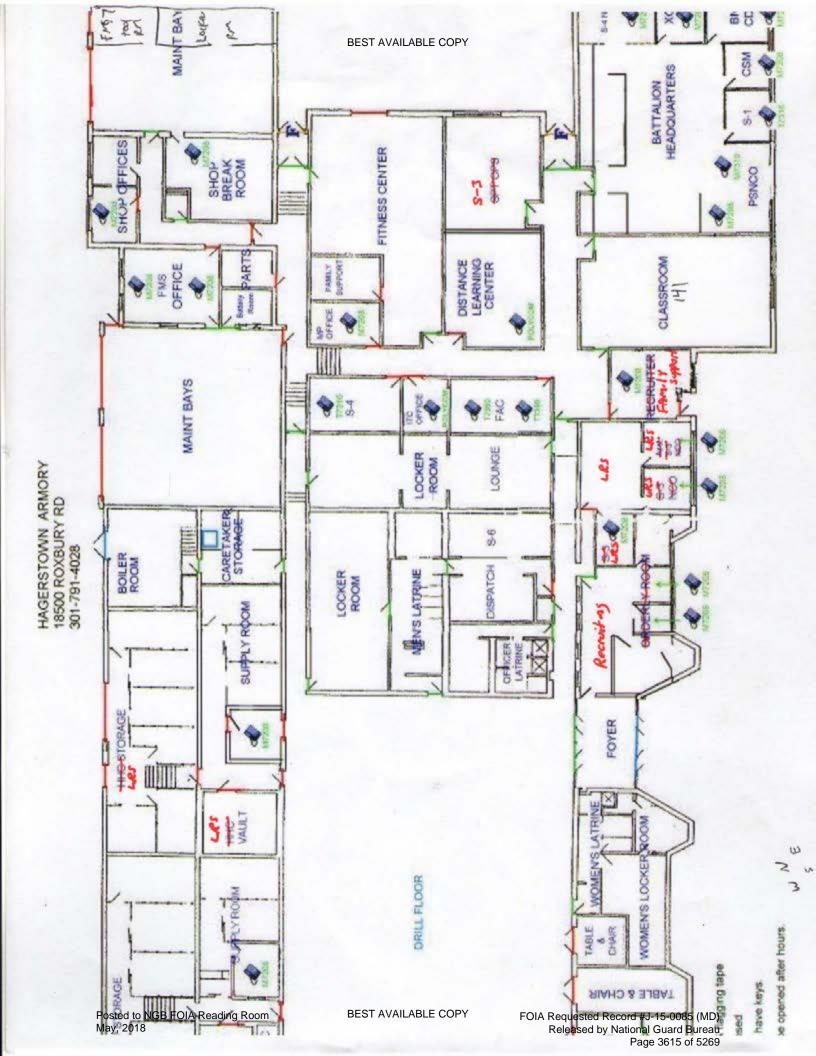
Principal Bonus Environmental, LLC



Principal Bonus Environmental, LLC BEST AVAILABLE COPY

<u>Appendix A</u>

Shop Diagram



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Appendix B

Lead Sample Results

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Environmental Lead See aihalqep.org for details

RECEIVED JUN 14 2010

507186 Chain Of Custody:

Hagerstown Armory

Hagerstown, MD

Job Location:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Address: Client

May, 2018

National Guard Bureau

Havre de Grace, Maryland 21078 State Military Reservation

ed to NGB FOIA Reading Room

Attention:

Job Name:

NY ELAP

100470

5/21/2010 Person Submitting: Date Submitted:

Report Date:

5/28/2010

Date Analyzed:

W912K6-09-A-0003

P.O. Number:

Job Number:

Hagerstown Armory

6/1/2010

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

Number	Number										
1047800	H-A-1	Flame	Air Blank	0	N/A	3	ug/m³	THE LEWIS CO., NO. OF THE PARTY	8	gn	
1047801	H-A-2	Flame	Air	862	N/A	3.5	ug/m³	\$	3.5	ug/m³	
1047802	H-A-3	Flame	Air	854	N/A	3.5	ug/m³	\$	<3.5	ug/m³	
1047803	H-W-1	Flame	Wipe Blank	* *	N/A	12	gn		<12	ßn	
1047804	H-W-2	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047805	H-W-3	Flame	Wipe	* *	0.111	110	ug/ft²	29	260	ug/ft²	
1047806	H-W-4	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug∕ff²	
1047807	H-W-5	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ff²	
1047808	9-M-H	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047809	H-W-7	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ff²	
1047810	H-W-8	Flame	Wipe	* * *	0.111	110	ug/ft²	1100	10000	ug/ft²	
1047811	H-W-9	Flame	Wipe	**	0.111	110	ug/ft²	<12	<110	ng∕ft²	
1047812	H-W-10	Flame	Wipe	***	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047813	H-W-11	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047814	H-W-12	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047815	H-W-13	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047816	H-W-14	Flame	Wipe	* * *	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047817	H-W-15	Flame	Wipe	***	0.111	110	ug/ft²	<12	<110	ug/ft²	
1047818	1047818 H-W-16 Flame Wipe **** 0.111 110 ug/ft² <12 <110 ug/ft²	Flame	Wipe	***	0.111	110	ug/ft²	<12	<110	ug/ft²	

AMA Analytical Services, Inc.

An AlHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

4475 Forbes Blvd. - Lanham, MD, 20706 · (301) 459-2640 · Toll Free (800) 346-0961 · Fax (301) 459-2643

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



NY ELA

100470



Report Date: 5/28/2010 5/21/2010 507186 Chain Of Custody: Person Submitting: Date Submitted: Date Analyzed: W912K6-09-A-0003 Hagerstown Armory Hagerstown Armory Hagerstown, MD Job Location: P.O. Number: Job Number: Job Name: 301-IH Old Bay Lane, Attn: NGB-AVN-SI, Havre de Grace, Maryland 21078 State Military Reservation National Guard Bureau Attention: Address: Client

Page 2 of 2

6/1/2010

Summary of Atomic Absorption Analysis for Lead

										The second secon	
AMA Sample Number	Client Sample Number		Analysis Type Sample Type	Air Volume (L)	Area Wiped (ft²)	Repo	Reporting Limit	Total ug	Final Result		Comments
1047819	H-W-17	Flame	Wipe	***	0.111	110	ug/ft²	<12	<110	ug/ft²	To the state of th
1047820	H-W-18	Flame	Wipe	***	0.111	110	ug/ft²	15	130	ug/ft²	
1047821	H-W-19	Flame	Wipe	***	0.111	110	ug/ff²	<12	<110	ug/ft²	
1047822	H-W-20	Flame	Wipe	* * *	0.111	110	ug/ft²	20	180	ug/ft²	
1047823	H-W-21	Flame	Wipe	***	0.111	110	ng/ft²	<12	<110	ug/ft²	
Analysis Method for F	Flame: Air, Wip	Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B	Solids: EPA 600/R	-93/200(M)-7420;	Water: SM-311	1 B	See QC S	ummary for ana	lytical results	See QC Summary for analytical results of quality control samples	ples
Analysis Method For	Furnace: Air, \	Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B	il/Solids: EPA 60	10/R-93/200(M)-7	421; Water: SM	-3113B	associated	associated with these sampes.	bes.		
N/A = Not Applicable		mg/Kg = parts per million (ppm) by weight		mg/L = parts per million (ppm)	lion (ppm)		NY ELAP	accreditation ap	plies only to p	NY ELAP accreditation applies only to paint chip, wipe, and soil	oii
%Pb = percent lead by weight ug = micrograms	by weight u	ug = micrograms	ug/L = parts per billion (ppb)	(ddd) uoillio			odilipics.				
Note: All samples we	re received in c	Note: All samples were received in good condition unless otherwise noted	otherwise noted								

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Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Analyst: Nida McGarvey

Final results are not corrected for any blank results are based on client supplied information nor verified by this laboratory.

Final results for air and Wipe results are based on client supplied information nor verified by this laboratory.

Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

Final results for air and wipe samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, and condition from us. Simple types, and completeness only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior writing and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior writing and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior writing and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used. In whole or in part, in any addressing or publicity matter without prior writing and accepted for the exclusive use of the client to whom it is addressed and upon the condition that are accepted for the exclusive use of the client to whom it is addressed and upon the condition that are accepted for the exclusive use of the client to whom it is addressed and upon the condition that are all the properties of the client to whom it is addressed and upon the condition that are all the properties are

Released by National Guard Bureau

Page 3618 of 5269

Gocations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

An AIHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

4475 Forbes Blvd. · Lanham, MD, 20706 · (301) 459-2640 · Toll Free (800) 346-0961 · Fax (301) 459-2643





QC Summary

Sample Delivery Group: 19407

Analysis Type:

Flame

Sample Type:

Air

Analysis Date:

5/28/2010

Acceptable

		Re	≩sult	Percent Recovery	RPD	Comment
Preparation Blank		-0.036	ppm			Acceptable
Report Limit Verification Sample	•	0.2222	ррт	88.9%		Acceptable
	.25	•		- · ·	-	
Duplicate Sample 1		-	mg/Kg			
Duplicate Sample 2			mg/Kg			Acceptable
Matrix Spike Analysis	••					
Spiked Sample				-		Acceptable
Spike Duplicate		•				Acceptable
Laboratory Control Sample I		 129.952		104.51%	 .	
Laboratory Control Sample 2		117,952	μg	101.95%	2 48%	Acceptable Acceptable

132,220 µg

Calibration Information

Correlation of Calibration Curve: 0.999723

All calibration verification samples are within acceptance limits.

Notes:

Samples included in this Sample Delivery Group (SDG)

Chain Of Custo	dy AMA Sample Number	Client Sample Number
507186	47800	H-A-1
507186	47801	11-A-2
SDG Number:	19407	

Page 1 of 2

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number							
507186	47802	H-A-3							
507187	47824	CV-A-1							
507187	47825	CV-A-2							
507187	47826	CV-A-3							
507236	48861	002 Personal 2443-4-13-10							
507236	48863	002 Personal 505A-4-14-10							
507236	48863	002 Personal 8958-4-15-10							
507236	48864	002 Personal 505A-4-16-10							
507236	48865	002 Personal 8958-4-21-10							
507236	48866	002 Personal 505A-4-22-10							
507236	48867	002 Personal 505A-4-26-10							
507236	48868	002 Personal 2443-4-27-10							
507236	48869	002 Personal 505A-4-29-10							
507236	48870	002 Personal 2443-4-30-10							
199937	49357	052710-LOC-01A							
199937	4935R	052710-1.OC-02A							
199937	49359	052710-1.QC-03A							
199937	49360	0\$2710-LOCH04A							

SDG Number: 19407

Page 2 of 2





QC Summary

Sample Delivery Group: 19392

Analysis Type:

Flame

Sample Type:

Wipe

Analysis Date:

5/27/2010

Recovery

Result

Percent RPD

Comment

Preparation Blank		0.012	ppm			Acceptable
Report Limit Verification Sample		0.2843	ppm	85.3%		Acceptable
Expected Spike Level (ppm)	0.3333			***************************************		
Duplicate Sample 1			mg/Kg			
Duplicate Sample 2			mg/Kg			Acceptable
Matrix Spike Analysis						
Spiked Sample						Acceptable
Spike Duplicate						Acceptable
Laboratory Control Sample 1		194.431	μg	102.31%		Acceptable
Laboratory Control Sample 2		188.033	μg	106.08%	3.62%	Acceptable

Calibration Information

Correlation of Calibration Curve:

0.999615

All calibration verification samples are within acceptance limits.

Notes:

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody AMA Sample Number Client Sample Number

507186

47803

H-W-1

507186

47804

H-W-2

SDG Number:

19392

Page 1 of 2

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
\$07186	47805	H-W-3
507186	47806	H-W-4
507186	47807	H-W-5
507186	47808	H-W-6
507186	47809	H-W-7
507186	47810	H-W-8
507186	47811	H-W-9
507186	47812	H-W-10
507186	47813	H-W-11
507186	47814	H-W-12
507186	47815	H-W-13
507186	47816	H-W-14
507186	47817	H-W-15
507186	47818	H-W-16
507186	47819][-W-17
507186	47820	11-W-18
507186	47821	11-W-19
507186	47822	H-W-20

SDG Number: 19392 Page 2 of 2



MATVD.

Focused on Results!!





Submitting Samples for National Guard Jobs

- 1) All samples shall be submitted to AMA Analytical Services, Attn: Sample Receiving, utilizing the enclosed Chain-of-Custody Form. The highlighted areas must be completed by the Subcontractor, however, the Sample Information/Analysis/Matrix section will not need to be completed if field date sheets are submitted with the samples. Please be sure to include a contact phone number for the person submitting the samples.
- 2) Results shall be reported via email to Non-Responsives:
 - a. National Guard Subcontracto

@bonusenvironmental.com

b. Non-Responsive IV NGB:

us.army.mil my.mil

c. CIV NGB

3) Hard Copy Reports & Invoices shall be handled in the following manner:

a. Original Invoices and Copies of Reports shall be sent to the National Guard

National Guard Bureau

Attn: Non-Responsive

301-IH Old Bay Lane

Attn: NGB-AVN-SI, State Military Reservation

Havre de Grace, Maryland 21078

b. Original Reports shall be sent the National Guard Subcontractor

Attn:	Non-	Responsive	
0/	Fice!	989-779-76	86
	:11:	989-621-386	2

- 4) All Pb Wipes shall be handled in the following manner:
 - a. All samples shall be analyzed utilizing FLAA procedures
 - Samples whose results are reported as less than the reporting limit, and the reporting limit is greater than 40ug/ft2 shall be re-analyzed utilizing GFAA procedures.
- 5) All other samples Pb Paints, Soils, & Airs, PCM Airs, PLM Bulks, TEM Airs, & TEM Bulks shall be analyzed utilizing standard analytical procedures

Asbestos · Lead · Mold

OWI (410) 247-2024

	(Please Refer To This Sheet / OF	Armory		(chone # (410) 042 022		O Verh OUS.army.mil	The Paint Chip The Dust Wige (wipe type Zhost Dest. 2 (OTY)		713	dia (OTV)	(QTV) J Culturable ID Species (Media)	CLIENT CONTACT	Date/Time: Contact: By:		Date/Time: Contact: By:			Confact: By:		5	Sign:
OMI (410) 247-2024	CHAIN OF CUSTODY	Sul	3. Job #: Hagerstown	5. nation (Results will	Date Due: 5-28-10 GeryAttempt Will Be Made to Accompage)		(QTY) (QTY) (YTY)	11. tprev/abs) Vacuum/Dust (QTY) 10. tv/arca) Dust D6480.99 (QTY)	(pres/abs) (QTY) (QTY) (QTY) (QTY)	received in good condition unless otherwise noted.	AWALIYSIS	A TUB A TUB	***	**************************************	**	111	**	7 7	1	By (Print)	Via: Moi
A AMA Apolitical Coming 1	Focused on Results www.amalab.com AIHA (#100470) NVLAP (#101143-0) NV ELAP (10920) 4475 Forbes BIvd. • Lanham. MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643	1. Client Name: National Guard Bureau 2. Address 1: 301-IH Old Bay Lane 3. Address 2: Attn: NGB-AVN-SI, State Military Reconnection	Address 3: Havre de Grace, Maryland 21078 Phone #: (410) 942-0273 Fax #-	R HOURS (must be pre-schemied)	,	licate Filter Type: OTY:	heate Filter Type: (QTV)	Y) (QTY)	DAY State Friable 198.1 COTY Cotton	ENTEN (Part) BUSINESS	CLIENT ID SAMPLE INFORMATION VOLUME IDENTIFICATION VOLUME	S-19 O	JW.	Held Andrea	7	19	H-W-8 W. LES Acras C	H-W-9 W. LPS Stocyc V.	Ā	STAFF ONLY: 2. Date I me Analyzed: /	

01/2 5

_(QTY) U.As__

-(QTY) - Cu_ _(QTY) _ Cu_

(673)

A Pb Air

D Pb Air

D Pb Soil/Soild

D Pb TCLP

D Dinking Water J Pb

Waste Water J Pb

D Pb Furnace (Media

9

(013) 93

Ouan (Varea) Vacuum D5755-95

(013)

_(QTY)

(10)

TEMAIr – Please Indicate Filter Type:

J. AHERA

(QTY)

O NIOSH 7402

U Other (specify,

PLM Bulk

O Qual. (pres/abs) Vacuum/Dust Quan. (v/arca)Dust D6480-99.

(QTX)

ৰ

O Po Paint Chip

Me Dust Wigg (wipe type

(OTY)

NY State PLM/TEM

Residual Ash_

(0)

(873)

JOTY) DAS

Collection Apparatus for Spore Traps/Air Samples:

Collection Media:

(073)

913

(013)

DELAP 198.2/EPA 100.2

J EPA 100.1

(575) (OTY)

Oual. (pres/abs)_

TEM Water

_(QTY)

(QTY)

(013)

ONY State Friable 198.1 Grav. Reduction ELAP 198.6_

Other (specify.

J Vermiculire

J EPA 600 − Visual Estimate.

EPA Point Count

J Spore-Trap_

(QTY)

OWI (410) 247-2024

⋖

@ <u>benjs</u> environ<u>umtal.c</u>om @us.army.mil @us.army.mil Sheet 2 of 507186 210 REV. 6.08 @ phone # _(410) 942-027 with Report W912K6-09-A-0003 REPORT TO: (Please Refer To This Number For Inquires) 159202 Armory Ź Reporting Information (Results will be provided as soon as technically feasible); S Inch 800 \$ \frac{7}{2} M. C. A. L. S. Submittal Information: Healess town Hagérstown, Job#: Hagerstown Armorz 5-28-1° D Results Required By Noon CHAIN OF CUSTODY (Every Attempt Will Be Made to Accomodate) Job Location Contact Person Submitted by NORMAL BUSINESS HOUSE ELAP 198.4/Chatfield Date Due: Fax #:_ (410) 942-0254 -Attn: NGB-AVN-SI, State Military Reservation. O Immediate O Next Day O 2 Day AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643 Address 3: ___Havre de Grace, Maryland_21078. AMA Analytical Services, Inc. www.amalab.com 4475 Forbes Blvd. • Lanham. MD 20706 Client Name: National Guard Bureau Address 1: 301-IH Old Bay Lane AFTER HOURS (must be pre-scheduled) (OTV) PCM Air – Please Indicate Filter Type: Phone #: _(410) 942-0273 Mailing/Billing Information: Focused on Results Date Due: Time Due Astros Amalysis Address 2: D Fiberglass O Immediate D 24 Hours Comments:

(F) 5 (YTO) - Culturable ID Genus (Media ■ Culturable ID Species (Media) J Surface Vacuum Dust CLIENT CONTACT (VI) -(0TY) Surface Tape. 81-115 2 Other (Specify. adv<u>i</u> TOCHS UVI UVI UVI A All samples received in good condition unless otherwise noted. LSDO y_{I/I_B} N/V a_{NON} Ç q_{Pq} ANATYSIS (TEM Water samples_ シャグ WIPE AREA LI Asbestos Soil PLM_(Qual. PLM_(Qual.) PLMTEM_(Qual.) PLMTEM_Qual. VOLUME LTERS DATE 2-19 SAMPLE INPORMATION SAMPLE LOCATION/ IDENTIFICATION W.LRS SPORT 3 CLIENT ID NUMBER -W-10 H-8-1

By: á (LABORATORY STAFF ONLY) Contact: Contact: Contact: Sign: Wat Ser Date/Time Date/Time: Date/Time Sign かいく By (Print) * Via By (Print): 1 7 @9.45 Via (6) ſ (2. Date/Time Analyzed: 3. Results Reported To:_ M- Supply OFFICE LRS Sporge E. Maint, barne W. Mant. barast HI WOSSE Shop break Rm Z 4. Comments: RECTUING Rm 156 Batters 3 LABORATORY STAFF ONLY: (CUSTODY) H-W-16 H-W-B H-W-14 H-W-15 H-W-20 としるしま H-W-18 H-W-19 H-W-1 してーター I

Initials:

Time:

-Date:

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Appendix C

Photographs

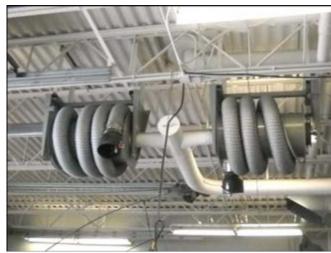
NGB/ Army National Guard – Hagerstown Readiness Center Project No. 1061-03



Building Exterior, south entrance



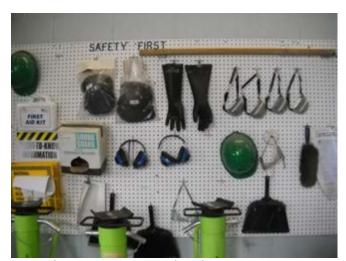
"Parts Room"/POL Room



East Maintenance Bays - Vehicle Exhaust Ventilation



Rm. 153, water stained ceiling tile



East Maintenance Bays – PPE board



East Maintenance Bays - parts washer

NGB/Army National Guard – Hagerstown Readiness Center Project No. 1061-03

August 4, 2010 Page 15



Battery Room, exhaust hood



Battery Room



Drill hall



West Maintenance Bays - Vehicle Exhaust Ventilation



East LRS Storage, flammable cabinet

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<u>Appendix D</u>

References



NGB/Army National Guard - Hagerstown Readiness Center Project No. 1061-03 August 4, 2010 Page 17

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NGB/Army National Guard - Hagerstown Readiness Center Project No. 1061-03 August 4, 2010 Page 18

- 20. Mold Remediation in Schools and Commercial Buildings, U.S. Environmental Protection Agency, March 2001
- 21. Army Facilities Management Information Document on Mold Remediation Issues TG277, February 2002
- 22. OSHA Welding, Cutting, Brazing 29 CFR 1910.252



1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 717.590.7031 Fax: 717.590.7936 www.complianceplace.com

Industrial Hygiene Survey Report

National Guard Facility Hagerstown Readiness Center

Prepared For: National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location: Hagerstown Readiness Center

18500 Roxbury Road

Hagerstown, MD 21740-9538

Prepared By: Compliance Management International

1215 Manor Drive

Suite 205

Mechanicsburg, PA 17055

Survey Date: December 18, 2012

Report Date: January 28, 2013

Non-Responsive

Non-Responsive, CIH

Manager, Industrial Hygiene Services

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on December 18, 2012, at the Hagerstown Readiness Center located at 18500 Roxbury Road, Hagerstown, MD 21740-9538. The survey was performed by Mr. Non-Responsive, CIH and Mr. Non-Responsive.

- 1. Lead surface and air samples were collected. Surface levels of lead were within recommended guidelines in all areas. Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 micrograms per cubic meter (ug/m³). See Section 3.0 for sampling results.
- 2. Lighting levels did not meet the American National Standard Institute/Illuminating Engineering Society of North America (ANSI/IESNA) recommended guideline in the Physical Fitness/Exercise Room. See Section 4.0 for detailed findings.
- 3. Indoor air quality (IAQ) parameters of temperature, relative humidity, carbon monoxide and carbon dioxide (ventilation) were recorded. Carbon monoxide and relative humidity were within recommended guidelines at the time of this survey. Carbon dioxide was above the recommended level of 1,079 ppm in many areas. This is most likely due to the use of a temporary propane heater in the administrative areas. Temperature levels were <68°F (criteria of 68-79°F) in most areas due to the main heating system being out of service at the time of this survey. See section 5.0 for results.
- 4. Several conditions or factors that could affect indoor air quality were observed at the time of this survey. This includes:
 - a. Sporadic water stained ceiling tiles throughout the facility that indicate sources of water infiltration (e.g. roof leaks and/or condensation on pipes);
 - b. Propane heaters being used inside the building envelope;
 - c. An FMS being connected to the Readiness Center (occasionally causes odors in the RC if the connecting door is left ajar).

Section 2.0 Operation Description & Observations

The Hagerstown Readiness Center is mainly an administrative facility with a drill hall, offices, classrooms, and storage areas. There were approximately 12 full-time employees stationed at this facility at the time of this survey. It was also noted that an FMS (Field Maintenance Shop) is attached to the Readiness Center.

The building was initially constructed in 1977 and included the Drill Hall and Firing Range. In 1997, the remainder of the building was constructed in 1997. The Firing Range was abated in 1995-1998. The building is a single story structure with a brick exterior. The interior walls are concrete block. The floors are concrete with vinyl floor tile.

Heat is normally supplied to the building using an oil-fired boiler with forced hot air and radiators; however, the boiler has been out of service since April 2012 and is currently being repaired. Until the boiler is returned to service, heat is being supplied by a portable propane heater in the administrative area. Several conditions were noted regarding this temporary heater:

- 1. The propane gas cylinder was not secured;
- 2. Electrical cords were running across the walkway creating a potential tripping hazard:
- 3. The propane heater contains an open flame.

Roof-top air conditioning units service the administrative portions of the building during the cooling season. RTU's are serviced by ARNG personnel located at another facility by work order; there is no scheduled maintenance.

The firing range has been converted into a bulky item storage area.

There is no child-care facility in the building.

Overall housekeeping practices were good. The facility is well maintained.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. There were no personnel complaints.

Section 3.0 Lead Testing

Due to the age of the building there is the potential for lead based paint to be present. Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the American Society for Testing and Materials (ASTM) E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using Environmental Protection Agency (EPA) Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Bulk (%)	Air ug/m ³	Surface ug/ft ²
1	Drill Hall	*	< 5.6	*
2	Room 142	*	< 5.5	*
3	Blank	*	<3	*
4	Converted Firing Range Floor	*	*	170
5	Converted Firing Range Contents	*	*	<110
6	Converted Firing Range Light Fixture	*	*	<110
7	Converted firing Range Heating Unit	*	*	<110
8	Entrance to Converted Firing Range	*	*	160
9	Drill Hall Floor center	*	*	<110
10	Drill Hall Top of Storage Locker	*	*	<110
11	Kitchen Top of Ice Maker	*	*	<110
12	Classroom 141 Supply Vent	*	*	<110
13	Room 142 Office Desk	*	*	<110
14	Fitness Center Top of Stereo Stand	*	*	<110
15	Orderly Room Top of File Cabinet	*	*	<110
16	Room 158 Office Desk	*	*	<110
17	Recruiting Office Desk	*	*	140
18	Main Hall Copier	*	*	<110
19	Blank	*	*	<12
-	Criteria	0.5	50	200

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. $ug/ft^2 = micrograms per square foot$
- 4. $ug/m^3 = micrograms per cubic meter$
- 5. $\mathbf{ug} = \text{micrograms}$

Source: NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges

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The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. This guideline is referenced in NG PAM 420-15 "Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges" as a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of $40~\text{ug/ft}^2$ on floors and $250~\text{ug/ft}^2$ on windowsills should be observed. There is no child care provided at this facility.

Lead surface and air samples were collected.

- Surface levels of lead were within the recommended guideline for all locations.
- Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³.

Section 4.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400L Precision Light Meter (Serial No. K98364). The light meter was last calibrated in April 2012. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles (FC)	Recommended Lighting (FC)	Sufficient Lighting
Recruiting Office	71.0	50	Yes
Converted Firing Range			
Storage Bulky Items	18.0	10	Yes
Supply Room 123	68.0	30	Yes
Classroom 141	56.0	30-50	Yes
Office 142	45.8	30-50	Yes
Office 158	84.3	30-50	Yes
Classroom 157	36.4	30-50	Yes
Physical Fitness/Exercise	26.0	30	No
Office 154	79.9	50	Yes
Office 140	78.8	50	Yes
C Troop Orderly Offices	41.0	30-50	Yes
Men's Locker Room	53.2	7	Yes
Men's Latrine	69.5	5	Yes
Assembly Drill Hall	42.6	30-50	Yes
Women's Latrine	84.7	5	Yes
Kitchen	55.1	50	Yes

Table Notes:

- 1. FC = Foot Candles
- 2. **Bolded** results did not meet listed criteria

Source: ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

The lighting level did not meet the minimum recommended guideline in the Physical Fitness/Exercise Room. Lighting should be improved in this area.

Section 5.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, carbon monoxide and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 8554 (Serial #02041015). The IAQ Meter was last calibrated in August 2012.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2010). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2010). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60%.

The following table summarizes the measurements collected.

IAQ Assessment Summary

IAQ Assessment Summary										
	Temperature	Relative	Carbon	Carbon						
Location	-	Humidity	Dioxide	Monoxide						
	(° F)	(%)	(ppm)	(ppm)						
Outdoors	59.9	49.0	408	2.4						
Recruiting Office	63.3	52.1	651	3.6						
Converted Firing Range	53.2	56.7	338	3.9						
Supply Room 123	52.9	57.8	379	3.8						
Classroom 141	63.3	55.8	1,100	1.9						
Office 142	66.9	53.9	2,006	2.4						
Office 158	70.9	48.1	1,670	1.6						
Classroom 157	73.9	39.3	1,183	1.7						
Physical Fitness/Exercise	66.4	45.6	1,040	1.6						
Office 154	73.0	46.2	1,266	1.3						
Office 140	71.8	41.1	1,229	1.6						
C Troop Orderly Offices	70.2	43.3	756	1.0						
Assembly/Drill Hall	55.9	51.6	380	1.1						
Kitchen	55.9	55.9	460	0.9						
Outdoors	52.0	57.7	350	1.5						
Criteria	68.0-79.0	30-60	<1,079	<9.0						

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. (%) = percent relative humidity
- 4. $\mathbf{F} = \text{degrees Fahrenheit}$

Source: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) 55-2010, 62-2010 & The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation.

Summary of findings and recommendations:

- Relative humidity measurements were within the recommended guidelines. Temperature measurements were below the recommended 68°F in several areas. These areas are typically supplied with heat from the boiler which is currently nonoperational.
- Carbon dioxide levels measured exceeded the recommended ceiling of 1,079 parts per million (ppm). This indicates that outdoor air ventilation is not adequate in all areas.
- Carbon monoxide levels measured were less than the recommended ceiling of 9 ppm.
- A visual inspection was conducted throughout accessible portions of the facility to assess sources or pathways of factors potentially deleterious to IAQ. The following observations were noted:
 - Water stained ceiling tiles were observed occasionally throughout the facility. This indicates sources of water infiltration (e.g. roof leaks and/or condensation on pipes); all sources of water infiltration should be identified and repaired. Water stained ceiling tile should be removed and replaced.
 - o Overall housekeeping was good.

May, 2018

Section 6.0 Suspect Asbestos Containing Building Materials

Based on the age of the building (e.g., constructed in 1977) asbestos-containing materials (ACM) could be present in the facility. No suspect ACM was observed at the time of this survey. Inaccessible areas such as behind walls or crawlspaces were not inspected.

Section 7.0 Equipment

The following equipment was utilized during this survey. All sampling equipment was properly calibrated prior to use and verified for accuracy as applicable. See daily reports and calibrations logs for detailed information.

Equipment	Serial #	Calibration Date	Value
TSI Q-Trak IAQ Meter	02041015	8/2012	NA
Cal Light 400 Light Meter	K98364	4/2012	NA
TSI 4199 Calibrator	41460827002	8/2012	NA
SKC Air Sampling Pump	647631	12/17/2012	1.81 LPM
SKC Air Sampling Pump	648349	12/17/2012	1.81 LPM

Section 8.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Compliance Management International, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report

AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

AIHA LAP, LLC

ACCREDITED LABORATORY
INDUSTRIAL HYGIENE, ENVIRONMENTAL LEAD
& ENVIRONMENTAL MCROBIOLOGY
ISQUECT 17925 2005
www.aihams.or.or.difections.org

LAB #100470

Client:

National Guard Bureau

Job Name:

Hagerstown, MD-RC

Chain Of Custody:

514845

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

18500 Roxbury Road

Date Submitted:

12/21/2012

Station St

State Military Reservation

Job Number:

Not Provided

Person Submitting:

Non-Responsi

1.79

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Date Analyzed:

12/27/2012

Report Date: 12/27/2012

Attention:

Non-Responsive

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)		orting Imit	Total ug	Final Res	ult	Comments
13025475	ı	Flame	Air	538	N/A	5.6	ug/m³	<3	<5.6	ug/m³	
13025476	2	Flame	Air	547	N/A	5.5	ug/m³	<3	<5.5	ug/m³	
13025477	3	Flame	Air Blank	0	N/A	3	ug/m³		<3	ug	
13025478	4	Flame	Wipe	****	0.111	110	ug/fl²	19	170	ug/ft²	
13025479	5	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025480	6	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025481	7	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025482	8	Flame	Wipe	****	0.111	110	ug/ft²	17	160	ug/ft²	
13025483	9	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025484	10	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025485	11	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025486	12	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025487	13	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025488	14	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025489	15	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025490	16	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025491	17	Flame	Wipe	****	0.111	110	ug/fl²	15	140	ug/ft²	
13025492	18	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
13025493	19	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AHHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

Page 3645 of 5269

AMA Analytical Services, Inc.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAS #100470

Client:

National Guard Bureau

Job Name:

Hagerstown, MD-RC

Chain Of Custody:

514845

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

18500 Roxbury Road

Date Submitted:

12/21/2012

State Military Reservation

Job Number:

Not Provided

Person Submitting:

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Date Analyzed:

associated with these

samples.

Report Date:

12/27/2012

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample

Client Sample

Analysis Type Sample Type Air Volume

Area Wiped

Reporting

Total ug Final Result Comments

Number

Number

(L)

(ft2)

Limit

See QC Summary for analytical results of quality control samples

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7000B; Water: SM-3111B Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7010; Water: SM-3113B

N/A = Not Applicable

mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm)

%Pb = percent lead on a dry weight basis

ug = micrograms

ug/L = parts per billion (ppb)

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Technical Manager:

G Edward Carney

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AIHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

OWI (410) 247-2024

159202

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AMA Analytical Services, Inc.
Focused on Results www.amalab.com
AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

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Appendix B. Photographs

Hagerstown Readiness Center December 18, 2012



Exterior of Facility



Exterior of Facility - Front



Assembly Hall



Converted Firing Range - Storage



FMS Shop Connected to Readiness Center

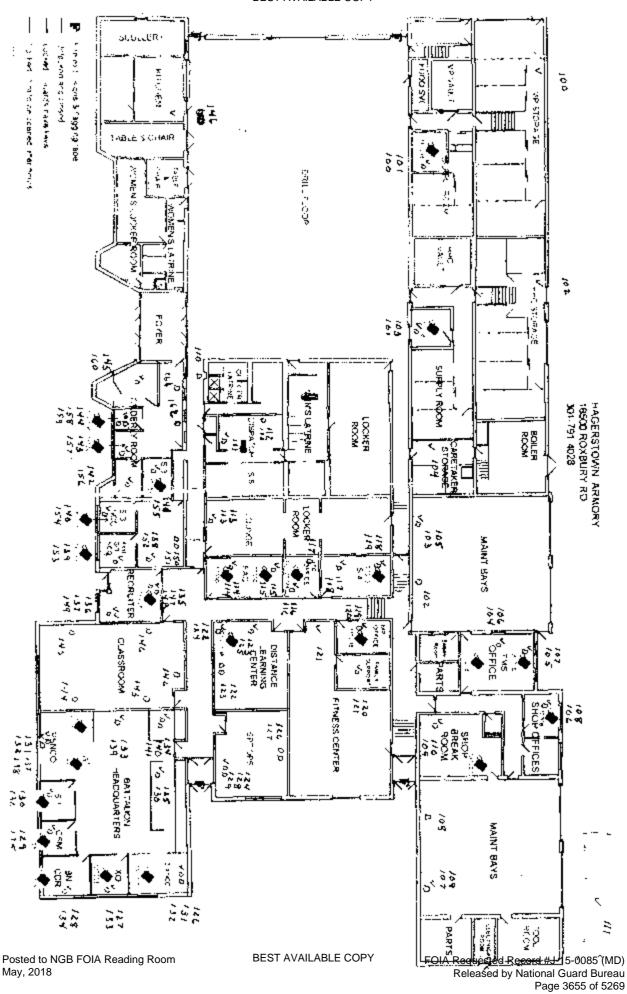


Boiler Room



Use of Temporary Heat – Propane Heater

Appendix C. Floor Plan



Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) -Threshold Limit Values and Biological Exposure Indices, 2011 Edition
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition
- 4. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Ventilation for Acceptable Indoor Air Quality, 62.1-2010
- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227(h)(3)]
- 9. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)
- 10. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, February 2002.
- 11. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 NOV 06.
- 12. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy, 55-2010.

May, 2018



DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

26 JULY 2005

MEMORANDUM FOR Region North Industrial Hygiene Office (NGB-AVS-SI-IH/Ms. Non-Responsive), Army National Guard Bureau, 301-IH Old Bay Lane, Havre de Grace, MD 21078

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Havre de Grace Armory, MD, Project No. 55-ML-01ED-03/05

- 1. Enclosed is the final copy of the subject report and two CD-ROMs.
- 2. The project number for this service reflects the current fiscal year of dispatch and the actual field work which was completed for fiscal year 2003. The State of Maryland Army National Guard occupational health nurse was immediately notified in writing of findings necessitating immediate corrective action in Maryland armories. In addition, the National Guard Bureau Region North Industrial Hygiene Office has been notified of all the results of lead in dust sampling conducted in all facilities. Draft reports were reviewed by you or other members of the National Guard and members of this Center, including our editorial staff, during drafting stages in report preparation leading up to the final report.
- 3. Our point of contact is Ms. Non-Responsive, at commercial 410-436-5475/3118, DSN 584-5475/3118, or electronic mail: vus.army.mil

FOR THE COMMANDER:

Non-Responsive

Director, Occupational Health Sciences

Encl

Readiness thru Health



U.S. Army Center for Health Promotion and Preventive Medicine



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MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS HAVRE DE GRACE ARMORY HAVRE DE GRACE, MD PROJECT NO. 55-ML-01ED-03/05 8 APRIL 2003



Approved for public release, distribution unlimited

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Readiness Thru Health

CHPPM YORM 432-E (MCHB-CS-IPD), OCT 43

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World Wer II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed \$3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- Integrity is the foundation.
- Excellence is the standard
- Customer satisfaction is the focus.
- Its people are the most valued resource
- Continuous quality improvement is its pathway.

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization flarcely proud of its history, yet equally excited about the future. It is destined to commune its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.



DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

EXECUTIVE SUMMARY
MARYLAND ARMY NATIONAL GUARD FACILITIES
INDUSTRIAL HYGIENE BASELINE SURVEYS
HAVRE DE GRACE ARMORY
HAVRE DE GRACE, MD
PROJECT NO. 55-ML-01ED-03/05
8 APRIL 2003

1. PURPOSE OF EVALUATION. To conduct surveys at Maryland Army National Guard (MDARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions. This survey will serve to establish a baseline so that an occupational exposure history can be compiled for each civilian or military employee for the Defense Occupational and Environmental Health Readiness System.

CONCLUSIONS.

- a. <u>Lead in Air</u>. All air samples were below the Occupational Safety and Health Administration (OSHA) standard for lead in air. There was no overexposure to personnel from lead in air in this building.
- b. <u>Lead in Dust</u>. Levels of lead in dust that exceeded safe limits for children and adults were found in the armory. These levels may result in health hazards to employees and to children visiting the armory.
- c. <u>Lead in Paint</u>. Chemical spot testing of deteriorated paint identified the presence of lead-based paint. Deteriorated lead-based paint is a potential hazard to armory occupants.
- d. <u>Lighting</u>. Lighting in some areas of the armory did not meet the Jiluminating Engineering Society of North America (IESNA) criteria. Inadequate lighting may impact employee vision and result in health and safety hazards.
- e. <u>Asbestos</u>. There was a potential for exposure to asbestos in the armory. Armory records showed that asbestos had been abated; however, some exposed pipe insulation and some vinyl floor tiles that were intact may be asbestos-containing material (ACM). Some intact vinyl floor tiles may contain asbestos. If damage occurs in the future, asbestos tiles and the exposed pipe insulation may become friable and asbestos fibers may be released.
- f. <u>Mold</u>. Excessive moisture in the armory had caused mold growth. Mold exposure may cause illness in armory employees.

Readiness thru Health



EXSUM MDARNG Facilities IH Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01FD-03/05

- g. <u>Safety</u>. The armory was continuing to address leaks in the roof and the resulting water damage. The roof and portions of the drop ceiling in the conference room were repaired in 2003 but the roof was reported to be leaking again in 2004. Armory work orders documented ongoing renovation work.
- h. <u>Ventilation</u>. Weapons maintenance was being conducted in the Arms Room. There was no ventilation in this room. There were potential exposures to lead and cleaning solutions. Inadequate ventilation of this operation may be hazardous to employee health.
- i. <u>Hazardous Materials Management</u>. The Hazardous Materials Storage Shed was unorganized and overcrowded. There was no written Hazard Communication (HAZCOM) Program. These findings may result in employee exposure to hazardous materials in the armory. The OSHA requires employers to provide information to their employees concerning hazardous chemicals to which they are exposed. This is accomplished by establishing a written HAZCOM program. Program elements include the use of labels and other forms of warning, material safety data sheets, and information and training addressing protective measures to employees.
- 3. RECOMMENDATIONS. The Department of Defense Instruction 6055.1 provides Risk Assessment Codes (RACs) for health hazards, a procedure which allows assessment of the magnitude of exposure to physical, chemical, and biological agents and the possible medical effects of exposure. The RAC is an expression of the risk associated with the hazard and combines the hazard severity and accident probability into a single number. The RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority.

a. Lead Exposure. Health Hazard RAC 3.

- (1) Occupational Exposure. Repair and stabilize all deteriorated paint. Clean the Drill Hall, Locker Room, and administrative area horizontal surfaces that have elevated lead levels to the National Guard Bureau (NGB) Region North and U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) recommended safe limit for floors and frequently contacted surfaces. Comprehensive guidelines for cleaning are in Appendix E. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after clean up. Cleaning dust containing lead may further prevent lead from becoming redistributed into adjacent rooms and resulting in exposures for children and for the general workforce. Ensure that personnel wear disposable gloves and disposable coveralls as extra protection when working in all areas identified as having elevated levels of lead.
- (2) Child Exposure. Address all potential lead hazards before continuing to extend use of this facility to children. Clean the floor in the Drill Hall to the Environmental Protection Agency lead in dust standards for young children, and clean other horizontal surfaces in the Drill Hall to the NGB Region North and USACHPPM decontamination level for lead in dust on frequently contacted surfaces.

EXSUM MDARNG Facilities IH Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

- b. <u>Lighting</u>. Health Hazard RAC 4. Increase lighting in Room 121, Room 106, and the Classroom to meet the IESNA recommended guidelines as indicated in Table 2, Lighting. Provide portable task lighting for Rooms 121 and 126. Provide additional ceiling lighting in the Classroom.
 - c. Asbestos Exposure. Health Hazard RAC 3 if asbestos is present.
- (1) Review armory and the MDNGB office records to determine whether there are asbestos records for inspection and abatement, or if there is an Asbestos Management Plan (AMP) for Havre de Grace Atmory.
- (2) If records cannot be located, sample the exposed pipe insulation and vinyl tiles to determine whether they are ACM.
- (3) If they are determined to be asbestos and become damaged, they must be encapsulated or removed as soon as possible.
- (4) Develop and implement an AMP if there is not one for the armory. Army policy requires an AMP for all asbestos in the facility, and to take immediate corrective action where a possible asbestos hazard has been identified.
- d. Mold Exposure. Health Hazards RAC 4. Remove and replace ceiling tiles with mold growth. Abate all areas of visible mold. For additional guidance on moisture control and mold remediation in the armory refer to USACHPPM TG 278, Industrial Hygiene/Preventive Medicine Mold Assessment Guides, and USACHPPM TG 277, Army Facilities Management Information Document on Mold Remediation Issues in Appendix F.
- e. <u>Safety Hazards</u>. Safety Hazards RAC 3. Continue to repair roof leaks and damaged building materials. Replace loose ceiling tiles.
- f. <u>Ventilation</u>. Health Hazards RAC 4. Conduct weapons maintenance in an area where there is adequate ventilation.
- g. <u>Hazardous Materials Management</u>. Health Hazards RAC 3. Organize the Hazardous Materials Storage Shed. Establish a written HAZCOM Program. Maintain records for HAZCOM training and store them in an accessible area.

BEST AVAILABLE COPY

MDARNG Facilities III Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

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Posted to NGB FOIA Reading Room

May, 2018



DEPARTMENT OF THE ARMY US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS HAVRE DE GRACE ARMORY HAVRE DE GRACE, MD PROJECT NO. 55-ML-01ED-03/05 8 APRIL 2003

- 1. REFERENCES. See Appendix A.
- 2. PURPOSE OF EVALUATION. To conduct surveys at Maryland Army National Guard (MDARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions. This survey will serve to establish a baseline so that an occupational exposure history can be compiled for each civilian or military employee for the Defense Occupational and Environmental Health Readiness System.
- 3. AUTHORITY. Fax, National Guard Bureau (NGB) Region North Industrial Hygiene Office (NGB-AVS-SI-IH/Ms. Non-Responsive), 28 February 2003, subject: SAB.
- 4. BACKGROUND INFORMATION.
- a. Armory Units, Organizations, and Mission. The Havre de Grace Armory is a Federal building and is located on the Havre de Grace Military Reservation. The resident units and organizations include the Headquarters and Headquarters Detachment, 1297th Corps Support Battalion, a general support maintenance company; the 2729 th Transportation Detachment, and the Organizational Maintenance Shop #3. The armory was originally built for use as a racetrack clubhouse. The building has a detached chemical and petroleum, oil and lubricant storage area. All vehicle maintenance is conducted outdoors except during inclement weather, when it is conducted in the organizational maintenance shop.
 - b. Date of Construction. The building is approximately 100 years old.
- c. <u>Armory Use by Children</u>. The point of contact (POC) stated that the armory is occupied by children a minimum of four times per year for a period of several hours for each visit. Events include summer picnics and holiday meals in the Drill Hall. The Maryland Military Department is currently advertising Havre de Grace Armory as available for rental for activities that include young children.

Readiness thru Health



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d. <u>POC</u>. MAJ ton-Responsive 410-278-8450, 301 Old Bay Lane, Havre de Grace, MD 21078-4094.

5. FACILITY EVALUATION.

a. <u>Sampling Locations and Results</u>. Samples were collected for lead in air, on surfaces (wipe samples), and in chemical spot tests to determine the presence of lead hazards. Lead sample results and locations are shown in Appendix B. Lighting levels were measured in office and classroom areas.

b. Physical Condition of Facilities.

- (1) Paint. The age of the buildings indicated that the presence of lead-based paint was likely. Some areas of deteriorated paint were found. Staff Sergeant (SSG) Non-Responsive, Environmental Compliance Assessment Coordinator for the Maryland NGB, stated that records showed that all lead has been abated in the former indoor firing range (IFR), but that there were no records of lead-based paint abatement in the armory.
- (2) Asbestos. SSGNon-Responsive stated that all asbestos had been abated in the facility, including asbestos tile. However, some exposed pipe insulation and some of the tiles that were intact may be asbestos-containing material (ACM). A site Asbestos Management Plan (AMP) was not located.
- (3) Mold and Moisture Problems. There was mold in the gym area. There was water damage in the Weight Room, and on the ceiling in the Mess Hall and Drill Hall.
- (4) Hazardous Materials Management. All chemicals and hazardous materials were stored in the outdoor Hazardous Materials Storage Shed. Products included antifreeze, brake fluid, hydraulic fluid, motor oil, and other lubricants.
- (5) Safety Hazards. The facility was aging and the roof had leaked for several years. The roof and portions of the drop ceiling in the Conference Room were repaired in 2003 but the roof was reported to be leaking again in 2004. We reviewed armory work orders that documented ongoing renovation work.
 - (6) IFR. The IFR had been closed, all lead abated, and cleaned.
- c. <u>Safety and Occupational Health Programs</u>. There were accessible material safety data sheets (MSDSs); however, there was no written Hazard Communication (HAZCOM) Program.

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- d. <u>Heating, Ventilation, and Air-Conditioning Systems</u>. The building was heated by an oil-fired furnace, and many rooms had steam baseboard radiators. Cooling was accomplished by several window type air conditioners mounted in regularly used offices, and by manual operation of windows. At the time of the survey, weapons maintenance was being conducted in the Arms Room. There was no ventilation in this room.
- e. <u>Noise Dosimetry</u>. No operations with the potential to generate hazardous noise levels were identified.
- f: <u>Housekeeping</u>. In general, armory and contract personnel appeared to practice good housekeeping. Custodial duties were performed by contract housekeeping personnel.
- 6. ASSESSMENT CRITERIA FOR LEAD. See Appendix C for details.
- a. <u>Lead in Air</u>. The Army complies with the Occupational Safety and Health Administration (OSHA) 8-hour time-weighted average Permissible Exposure Limit of 50 micrograms of lead per cubic meter (μg/m³) of air.
- b. Lead in Dust. The Environmental Protection Agency (EPA) and State of Maryland limits for lead in dust are 40 micrograms per square foot (μg/ft²) on floors, 250 μg/ft² on window sills, and 400 μg/ft² in window troughs. These limits apply to pre-1978 Army facilities only if children under 6 years of age occupy them for 60 or more hours per year. The NGB Region North concurs with the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) recommended safe limit of 200 μg/ft² on floors and frequently contacted surfaces, which is more stringent for window sills than the EPA/State standards.
- c. <u>Lead in Paint</u>. Paint containing lead levels of 0.5 percent or more by weight in dried solid (also reported as 5000 milligrams per kilogram) is considered to be lead-based paint according to both Federal and Maryland State Regulations. Paint containing lead levels of more than 0.7 milligrams per square centimeter is considered to be lead-based paint according to Maryland State Regulations. In Army Regulation 420-70, Buildings and Structures, lead-contaminated paint is defined as any paint containing detectable amounts of lead. The Army considers lead-contaminated paint to be potentially hazardous to children if it is disturbed or deteriorating.
- d. <u>Lead Carcinogenicity</u>. The Department of Health and Human Services National Toxicology Program (NTP) released the Report on Carcinogens, Eleventh Edition in February 2005. The NTP report lists "lead and lead compounds" as "reasonably anticipated to be human carcinogens".
- PHOTOGRAPHS. See Appendix D.

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\$AMPLING RESULTS, DISCUSSION, AND CONCLUSIONS.

- a. <u>Lead in Air</u>. General area lead in air sampling was conducted in the 1297th Supply Room, the HD Commo Room, and in the Drill Hall. The air sample results were below laboratory reporting limits of 3 μ g/m³ to 4 μ g/m³. All air samples were below the OSHA standard of 50 μ g/m³ for lead in air. There was no overexposure to personnel from lead in air in this building.
- b. Lead in Dust. Levels of lead in dust that exceeded safe limits for children and adults were identified on top of the 2729^{th} Transportation Detachment display board in the front door foyer, in the Drill Hall above the window ledge, and on top of a wall locker in Room 106. These levels may result in health hazards to employees and to children visiting the armory. Lead in dust sample locations and analytical results are shown in Table 1. All sample results that were greater than or equal to $40~\mu g/ft^2$ for floors or $200~\mu g/ft^2$ for other surfaces are highlighted.

TABLE 1. Lead in Dust Wipe Locations and Analytical Results.

Sample Numbers	Type of Sample	Locations	Result µg/ft²
HDW01	Wipe	Former IFR top of shelves	74
HDW02	Wipe	Drill Hall floor by stairs/one foot from wall	58
HDW03	Wipe	Drill Hall floor by stairs/one foot from wall	36
HDW04	Wipe	Drill Hall floor by stairs/three feet from wall	<23
IIDW05	Wipe	Kitchen counter top	<23
HDW06	Wipe	Kitchen top of refrigerator	28
HDW07	Wipe	Drill Hall top of window casing	3527
HDW08	Wipe	Room 128 Break Room top of gray storage cabinet	<23
HDW09	Wipe	Front door foyer/top of divider/2729 th display board	5045
HDW10	Wipe	Bn XO Office, desk top next to hallway door	77
RDWII	Wipe	Room 106/1297 th CSB Supply Room top of wall locker	364

- c. <u>Lead in Paint</u>. Chemical spot testing was used to identify deteriorated lead-based paint. Qualitative lead testing was conducted with chemical spot tests according to the American Society for Testing and Materials E1753-04 Standard Practice for Use of Qualitative Chemical Spot Test Kits for Detection of Lead in Dry Paint Films. Deteriorated lead-based paint is a potential hazard to amory occupants.
- d. <u>Lighting</u>. Lighting levels were measured in frequently used areas of Room 121, Room 106 and the Classroom. The results are shown in Table 2. The Illuminating Engineering Society of North America (IESNA) recommends a minimum illumination level of 11-30 foot-candles

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(fc) for occasional visual tasks (such as locating tools and supplies), 31-50 fc for performing large-scale tasks (such as major vehicle repair operations), and 51-100 fc for tasks of medium contrast and small size (such as general office work). Lighting levels in Room 121, Room 106, and the Classroom did not meet these criteria. Inadequate lighting may impact employee vision and result in health and safety hazards.

TABLE 2. Lighting Levels

Room	Location	Illumination, foot-candles
Room 121	Desktop	11.3-18.6
Classroom	Various locations	12.0-17.7
Room 106/1297th CSB Supply	Various locations	18.4-57
Room	1	_

- c. Asbestos. There was a potential for exposure to asbestos in the armory. Armory records showed that asbestos had been abated; however, some exposed pipe insulation and some vinvl floor tiles that were intact may contain asbestos. If damage occurs in the future, they may become friable and asbestos fibers may be released. Army policy requires the armory to establish and execute an AMP for all asbestos in the facility, and to take immediate corrective action where a possible asbestos related health hazard has been identified.
- f. Mold. Excessive moisture in the armory had caused mold growth. Mold exposure may cause illness in armory employees.
- g. Safety. The armory has continued to address leaks in the roof and the resulting water damage. Employees are potentially exposed to hazards if ceiling tiles fall and to slip hazards from water on the floor.
- h. Ventilation. Weapons maintenance was being conducted in the Arms Room, and there was no ventilation in this room. There were potential exposures to lead and cleaning solutions. Inadequate ventilation of this operation may be hazardous to employee health.
- i. Hazardous Materials Management. The Hazardous Materials Storage Shed was unorganized and overcrowded. (See Photograph numbers 699-700). There was no written HAZCOM Program. These deficiencies may result in employee overexposure to hazardous materials in the armory. The OSHA requires employers to provide information to their employees concerning hazardous chemicals to which they are exposed. This is accomplished by establishing a HAZCOM Program for armory employees. Program elements include the use of labels and other forms of warning, MSDSs, and information and training addressing protective measures for employees.

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- 9. RECOMMENDATIONS. The Department of Defense Instruction 6055.1 provides Risk Assessment Codes (RACs) for health hazards, a procedure which allows assessment of the magnitude of exposure to physical, chemical, and biological agents and the possible medical effects of exposure. The RAC is an expression of the risk associated with the hazard and combines the hazard severity and accident probability into a single number. The RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority.
 - a. Lead Exposure. Health Hazard RAC 3.
- (1) Occupational Exposure. Repair and stabilize all deteriorated paint. Clean the Drill Hall, Locker Room, and administrative area horizontal surfaces that have elevated lead levels to the NGB Region North and USACHPPM recommended safe limit for floors and frequently contacted surfaces. Comprehensive guidelines for cleaning are in Appendix E. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after clean up. Cleaning dust containing lead may further prevent lead from becoming redistributed into adjacent rooms and resulting in exposures for children and for the general workforce. Ensure that personnel wear disposable gloves and disposable coveralls as extra protection when working in all areas identified as having elevated levels of lead.
- (2) Child Exposure. Address all potential lead hazards before continuing to extend use of this facility to children. Clean the floor in the Drill Hall to the EPA lead in dust standards for young children, and clean other horizontal surfaces in the Drill Hall to the NGB Region North and USACHPPM decontamination level for lead in dust on frequently contacted surfaces.
- b. <u>Lighting</u>. Health Hazard RAC 4. Increase lighting in Room 121, Room 106, and the Classroom to meet the IESNA recommended guidelines as indicated in Table 2, Lighting. Provide portable task lighting for Room 121 and Room 126. Provide additional ceiling lighting in the Classroom.
 - c. Asbestos Exposure. Health Hazard RAC 3 if asbestos is present.
- (1) Review armory and the MDNGB office records to determine whether there are asbestos records for inspection and abatement, or if there is an AMP for Havre de Grace Armory.
- (2) If records cannot be located, sample the exposed pipe insulation and vinyl tiles to determine whether they are ACM.
- (3) If they are determined to be asbestos and become damaged, they must be encapsulated or removed as soon as possible.

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- (4) Develop and implement an AMP if there is not one for the armory. Army policy requires an AMP for all asbestos in the facility, and to take immediate corrective action where a possible asbestos hazard has been identified.
- e. <u>Mold Exposure</u>. Health Hazard RAC 4. Remove and replace ceiling tiles with mold growth. Abate all areas of visible mold. For additional guidance on moisture control and mold remediation in the armory refer to USACHPPM TG 278, Industrial Hygiene/Preventive Medicine Mold Assessment Guides, and USACHPPM TG 277, Army Facilities Management Information Document on Mold Remediation Issues in Appendix F.
- f. <u>Safety Hazards</u>. Safety Hazard RAC 3. Continue to repair roof leaks and damaged building materials. Replace loose ceiling tiles.
- g. <u>Ventilation</u>. Health Hazard RAC 4. Conduct weapons maintenance in an area where there is adequate ventilation.
- h. <u>Hazardous Materials Management</u>. Health Hazard RAC 3. Organize the Hazardous Materials Storage Shed. Establish a written HAZCOM Program. Maintain records for HAZCOM training and store them in an accessible area.
- 10. SITE MAPS. See Appendix G.
- 11. ADDITIONAL ASSISTANCE. For additional assistance, or questions concerning this report, please contact the undersigned at DSN 584-3118, commercial 410-436-3118, or by email to: Non-Responsive @us.army.mil



Industrial Hygienist USACHPPM Lead and Asbestos Team Leader Industrial Hygiene Field Services Program

APPROVED:



Technical Program Manager Industrial Hygiene Field Services Program

MDARNG Facilities III Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

- 1. Occupational Safety and Health Administration (OSHA) Title 29, Code of Federal Regulations (CFR), Part 1910.107 and 1910.94. http://www.osha.gov/comp-links.html
- 2. Department of Defense Instruction (DoDI) 6055.1, Department of Defense Occupational Safety and Health (OSH) Program, August 19, 1998. http://www.dtic.mil/whs/directives/corres/pdf/i60551_081998/i60551p.pdf
- 3. AR 40-5, Medical Service, Preventive Medicine, 15 October 1990. http://www.usapa.army.mil/pdffiles/r40_5.pdf
- 4. AR 385-10, The Army Safety Program, 29 February 2000. http://www.usapa.army.mil/pdffiles/r385_10.pdf
- 5. DA Pam 40-503, Medical Services, Industrial Hygiene Program, 30 October 2000. http://www.usapa.army.mil/pdffiles/p40_503.pdf
- 6. American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs), ACGIH Cincinnati, OH, 2004. http://www.acgih.org/TLV/
- 7. American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE) 62-2002, Ventilation for Acceptable Indoor Air Quality, ASHRAE, Atlanta, GA.
- 8. Illuminating Engineering Society of North America, ANSI/IESNA RP-1-1993, American National Standard Practice for Office Lighting, ANSI/IES RP-1-1993.
- 9. USACHPPM Interim Report No. 39-EJ-1157-99, Derivation of Wipe Surface Screening Levels for Environmental Chemicals, 1999.
- 10. OSHA Instruction, CPL 02-02-058 CPL 2-2.58 29 CFR 1926.62, Lead Exposure In Construction; Interim Final Rule-- Inspection and Compliance, Procedures, 1993. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1570
- 11. U.S. Department of Housing and Urban Development (HUD), Technical Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing 1998. http://www.hud.gov/offices/lead/guidelines/hudguidelines/index.cfm

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APPENDIX B

SAMPLING SHEETS AND LAB ANALYSES



TEST REPORT Page 1 of 2 4/18/03

Submitted To:

NGB, ANG Region IH North

ATTN: NGB-AVS-S1 301 Old Bay Ln.

Havre de Grace, MD 21078-4094

Reference Data:

Lead

Client Sample No.:

HDAirl through Blank

P.O. No.:

Not Available

Sample Location:

Havre de Grace, MD

Sample Type:

Filter

Method Reference:

NIOSH 7300

DCL Set ID No .:

03-S-1836

DCL Sample ID No.:

03-11968 through 03-11971

Sample Receipt Date: Preparation Date:

4/17/2003

04/17/03

Analysis Date:

04/18/03

The samples were prepared and analyzed in accordance with NIOSH method 7300 using a Perkin Elmer 3000XL ICP.

The sample condition upon receipt was acceptable except where noted.

The results are in the enclosed data table. Results relate only to the items tested and are not blank corrected except when clearly indicated.

This report shall not be reproduced except in full, without the written approval of the laboratory.



Analyst

Reviewer

CINCINNATI OFFICE 4900 GLENDALE-MILFORD ROAD CINCINNATI, OHIO 45242-9700 519 730-5036, FAX 513 733-5347

WEST COAST OFFICE 11 SANTA YORMA COURT NOVATO, CAUFORNIA 94945 800 280-0071, FAX 415 893-9469

LEADING ANALYTICAL CHEMISTRY INTO THE 21ST CENTURY

04/18/2003 14:15

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TEST REPORT Page 2 of 2 03-S-1836

Results Lead

Client #	DCL #	Sample Volume (L)	μg/sample	mg/m³
HDAir1	03-11968	382	ND	<0.003
HDAir2	03-11969	354	ND	<0.003
HDAir3	03-11970	264	ND	<0.004
Blank	03~11971	0	ND	
	Prep Blank		ND	
% Recovery	LCS		109.	
RPL	;		1.	

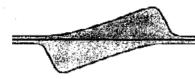
ND indicates that the value was not detected at or above the reporting limit (RPL).

LCS stands for laboratory control sample.





Reviewer



Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

April 21, 2003

Project Description: RES 92201-1 55MA014W None Given

Army National Guard IH - West 3401 Quebec Street Denver CO 80207

Dear Customer.

Reservoirs Environmental, Inc. is an environmental analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the American Industrial Hygiene Association, Lab ID 101533 - Accreditation Certificate #480. The laboratory is currently proficient in both PAT & ELPAT programs respectively.

Reservoirs has analyzed the following sample(s) using Atomic Absorption (AA) / Atomic Emission Spectroscopy - Inductively Coupled Plasma (AES-ICP) per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in Table I. Results have been faxed to your office.

RES 92201-1 is the job number assigned to this study. This report is considered highly confidential and property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those authorized by the client. Samples will be disposed of after sixty days unless longer storage is requested. If you should have any questions about this report, please feel free to call me at 303-964-1986.



President

RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE I. ANALYSIS: LEAD BY WIPE SAMPLING

RES Job Number: RES 92201-1

Client: Army National Guard III - West

Client Project Number / P.O.: 55MA014W
Client Project Description: None Given
Date Samples Received: April 18, 2003

Analysis Type: USEPA SW846 3050B / AA(7420)

Turnaround: 3-5 Day
Date Samples Analyzed: April 21, 2003

Client	Lab	Sample	LEAD	Detection	LEAD
(I) Number	ID Number	Area (sq.ft.)	(дд)	Limit (µg/sq.ft.)	CONCENTRATION (μg/sq.ft.)
HD Blank I	EM 762898	0.11	BDL	23	BDI.
HD WI	EM 762899	0.11	8.1	23	74
HD W2	EM 762900	0.11	6.4	23	58
HD W3	EM 762901	0.11	4.0	23	36
HD W4	EM 762902	0.11	BDL	23	BDL.
HD Blank 2	EM 762903	0.11	BDL	23	BUL
HD W5	EM 762904	0.11	BDI,	23	BDL,
HD W6	EM 762905	0.11	3.1	23	28
HD W7	EM 762906	0.11	388.0	23	3527
HD W8	EM 762907	0.11	BDL	23	BDL.
HD W9	EM 762908	0.11	555.0	23	5045
HD Blank 3	EM 762909	0.11	BDL	23	BD1.
HD W10	EM 762910	0.11	8.5	23	77
HD WIT	EM 762911	0.11	40.0	23	364

^{*}Calculations Based On A 1 sq.ft. Sample Area Unless Otherwise Noted

Data Qa

MDARNG Facilities IH Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX C

NATIONAL GUARD BUREAU REGION NORTH INDUSTRIAL HYGIENE OFFICE
ASSESSMENT CRITERIA FOR LEAD

SUBJECT: National Guard Bureau Region North Industrial Hygiene Office Proposed Recommendations for Surface Lead in Armories

- 1. In armories that do not contain childcare facilities, the NGB Region North Industrial Hygiene Office recommends cleaning the areas in which sample results are greater than 200 µg/ft². This guidance is based on professional judgment, risk assessments, adaptation of OSHA guidance, and feasibility of cleaning to a certain level.
- a. The EPA standards (40 CFR 745.227(e) (8) (viii)) and State of Maryland standards are not directly applicable because they are developed for floors (40 μ g/ft²), windowsills (250 μ g/ft²)and window troughs (400 μ g/ft²) in residential and childcare facilities. Most of the wipe samples in armories were collected in undisturbed areas and therefore, results are worst case scenarios and do not correlate to these standards.
- b. The OSHA has no specific requirement for work area surfaces. The OSHA lead standard (29 CFR 1910.1025(h)) states that all surfaces shall be maintained as free as practicable of accumulations of lead. In workplaces where lead is generated, surface levels may be much higher, but personnel exposures can be controlled by limiting airborne lead levels and following good cleanup and hygienic practices.
- c. The OSHA cites a level of 200 μ g/ft² in OSHA Instruction CPL 2-2.58 as guidance to its own inspectors for evaluating the cleanliness of lunchroom and locker room surfaces that are supposed to be kept as clean as possible.
- d. In a report titled Derivation of Wipe Surface Screening Levels for Environmental Chemicals, USACHPPM has determined that 200 $\mu g/\Omega^2$ is a safe surface contamination level for adult exposures. They have also applied these standards as the decontamination levels for surfaces in administrative offices.
- e. It should be noted that levels higher than those recommended above do not necessarily mean there is a significant hazard to workers who are following good cleaning and hygienic practices since there is no correlation between wipe and air samples. Rather, we recommend these levels as a precautionary measure.
- 2. The NGB Occupational Health Branch is developing guidance for armories that are used as childcare facilities. All States will receive this guidance when it is completed.
- 3. Ambient air samples collected in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 50 µg/m³ averaged over an 8-hour day. Therefore, based on these conditions there was no overexposure to personnel from lead in this building.

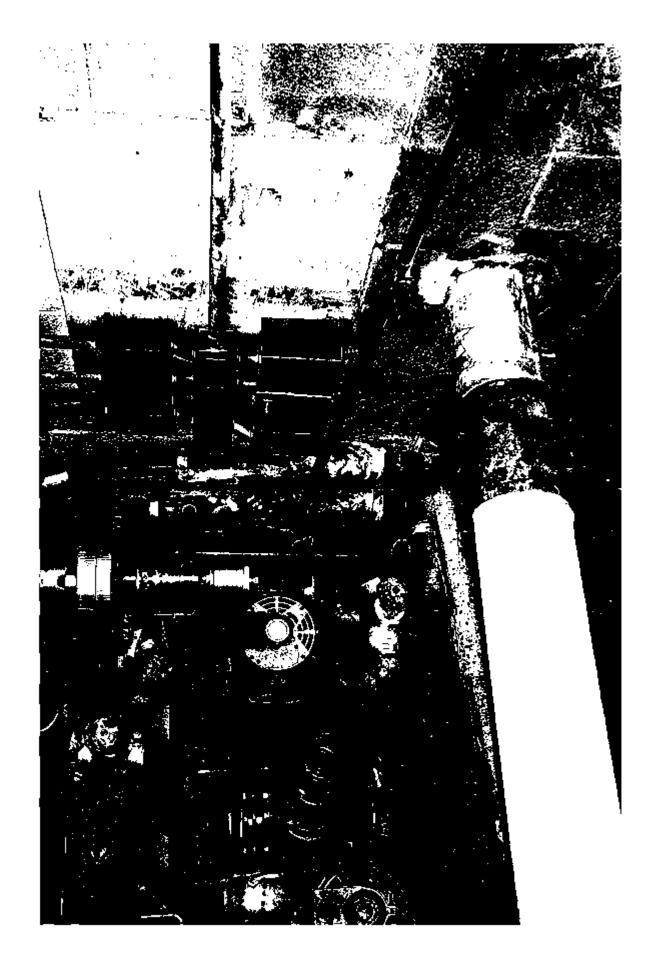
MDARNG Facilities III Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX D

PHOTOGRAPHS

Havre de Grace Armory Photographs

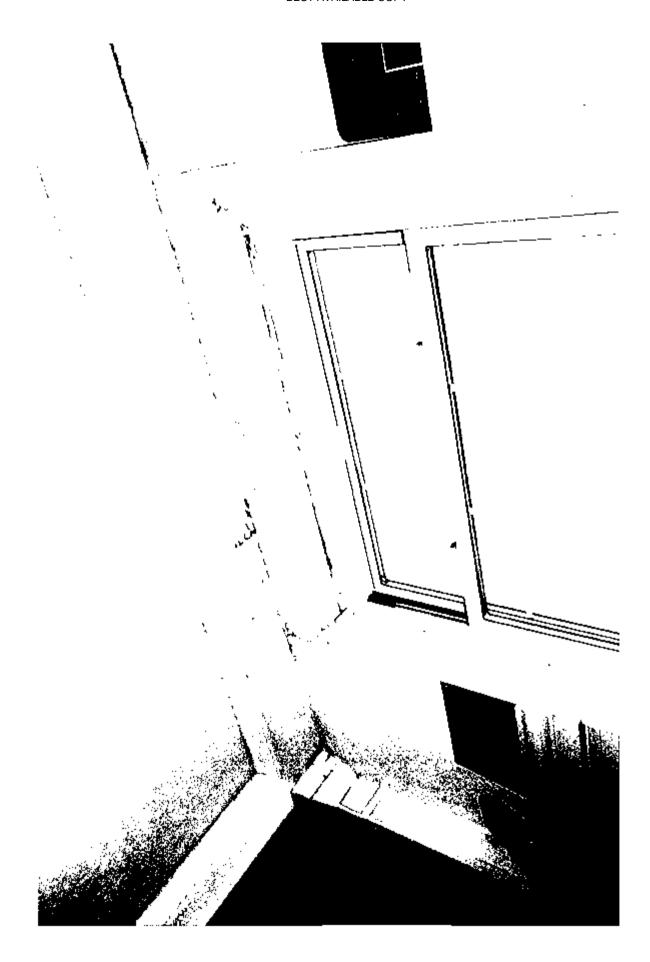
Photo Number	Location
685	Basment/pipe insulation
686	Basment/pipe insulation
687	Room 106 Supply Room/ lead air sampling and lead in dust sampling
688	Plaque Room/Drill Hall/Mess Hall areas/water damage in ceiling
689	Plaque Room/Drill Hall/ deteriorated paint
690	Conference Room drop ceiling/water damage
691	Room 206/deteriorated paint on window sill
692	Drill floor by stair/lead in dust sampling
693	Kitchen counter top/lead in dust sampling
694	Kitchen top of refrigerator/lead in dust sampling
695	Plaque Room/Drill hall /above window ledge /lead in dust sampling
696	Rm 128 Break room top of gray storage cabinet/lead in dust sampling
697	Front door foyer/top of divider/1729th Maintenance Board/lead in dust sampling
698	Bn XQ Office desk top next to ballway door/lead in dost sampling
699	Hazardous Materials Storage area
700	Hazardous Materials Storage area

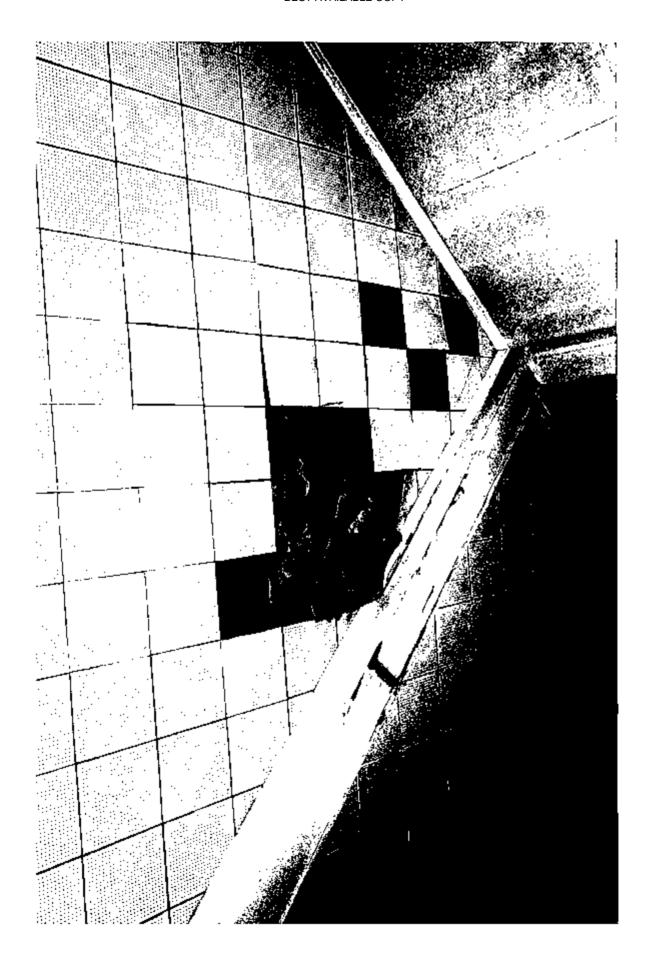




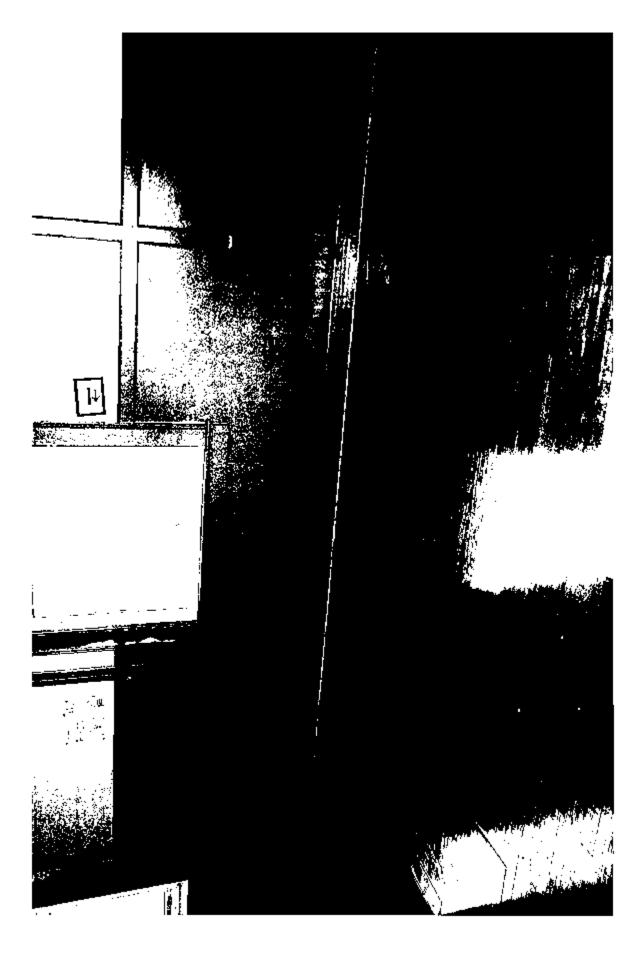


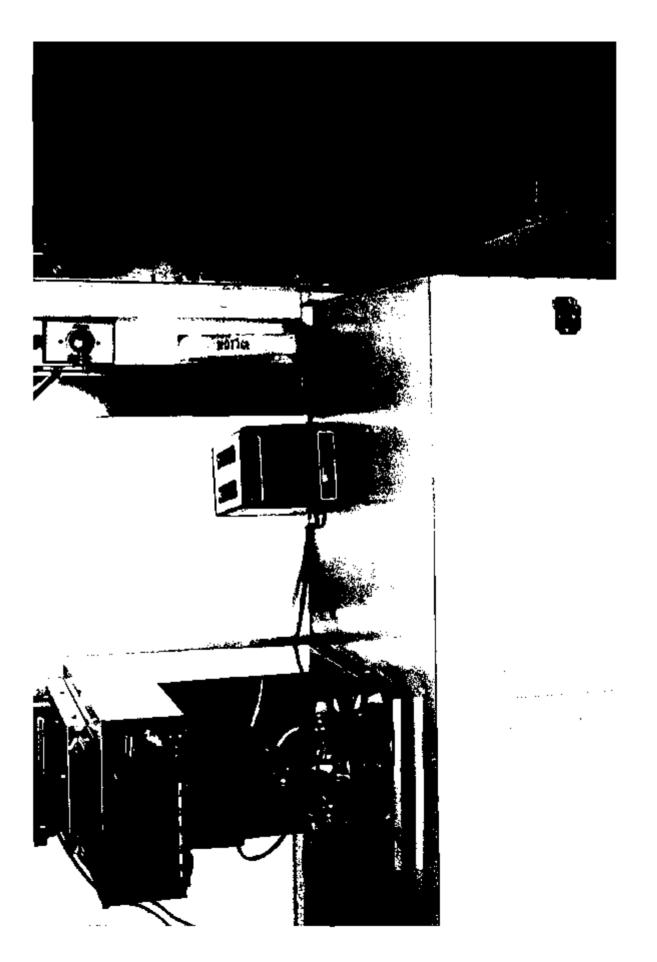








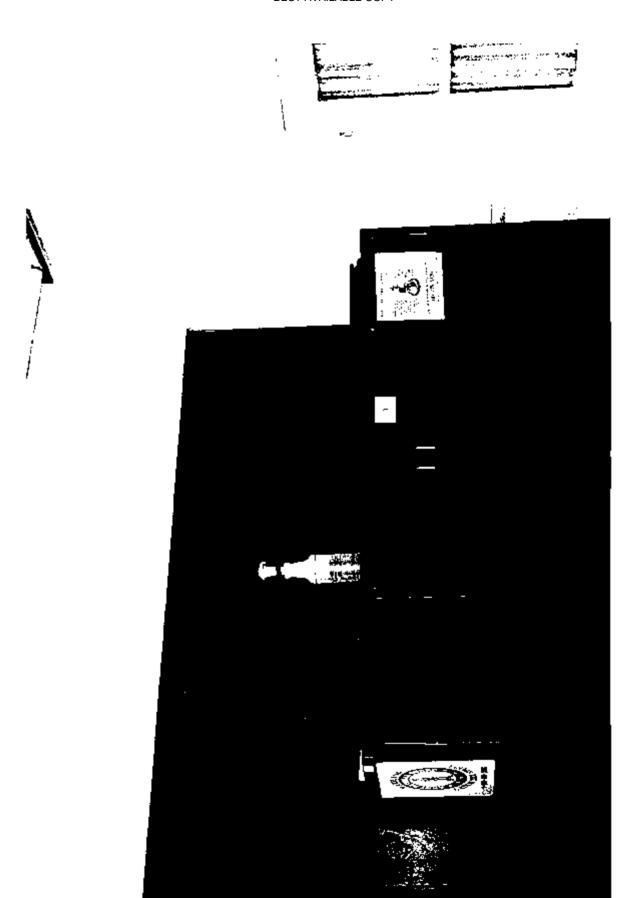


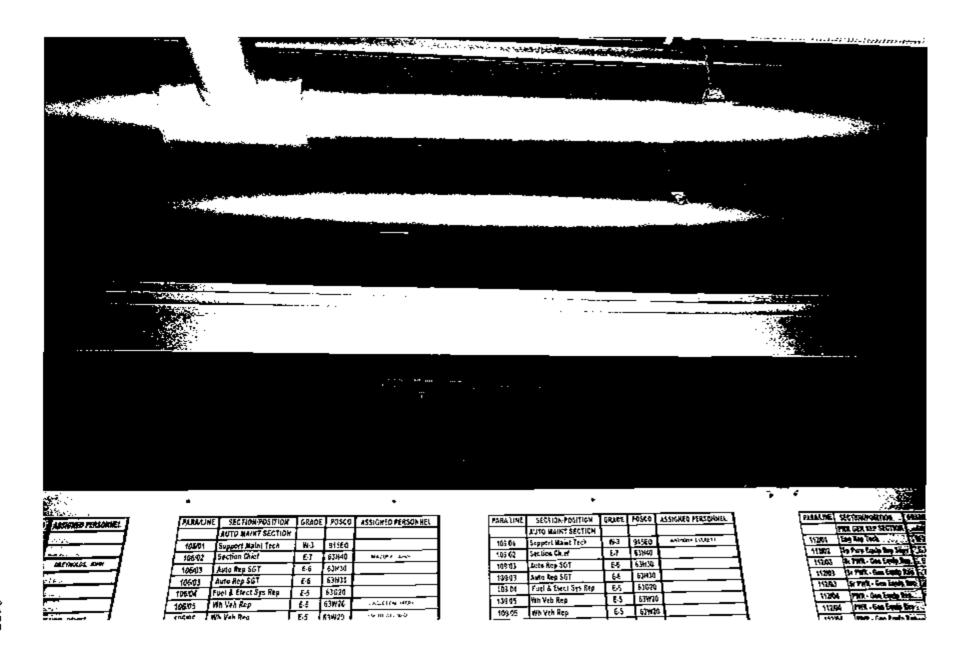




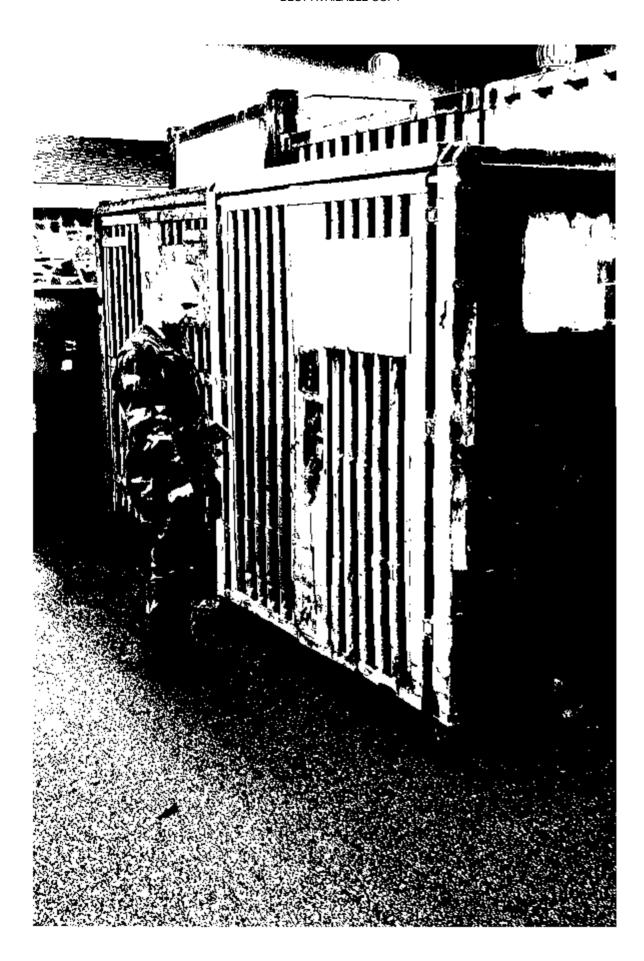
Posted to NGB FOIA Reading Room May, 2018

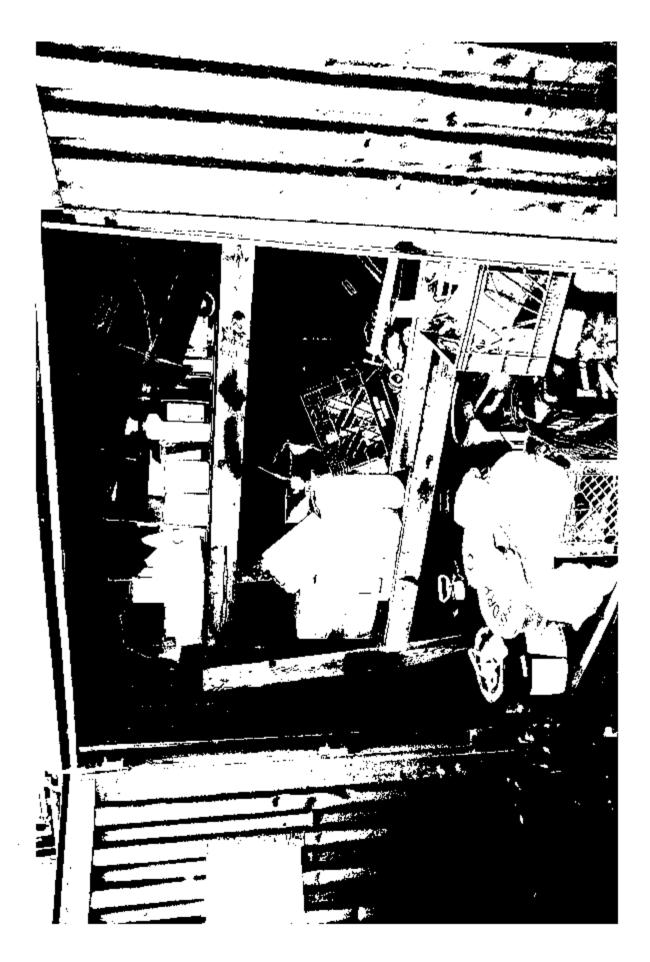












MDARNG Facilities IH Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX E

LEAD CLEANING GUIDANCE

HUD TECHNICAL GUIDELINES FOR THE EVALUATION AND CONTROL OF LEAD-BASED PAINT HAZARDS IN HOUSING 1998





CHAPTER 14: CLEANING

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Step-by-Step Summary



Cleaning: How To Do It

- Include step-by-step procedures for precleaning, cleaning during the job, and daily and final cleanings in project design or specifications.
- 2. Assign responsibilities to specific workers for cleaning and for maintaining cleaning equipment.
- 3. Have sufficient cleaning equipment and supplies before beginning work.
- If contamination is extensive, conduct precleaning of the dwelling unit. Move or cover all furniture
 and other objects.
- 5. Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust. Decontamination of all tools, equipment, and worker protection gear is required before it leaves containment areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
- 6. Schedule sufficient time (usually 30 minutes to an hour) for a complete daily cleaning, starting at the same time near the end of each workday after lead hazard control activity has ceased.
- For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
- 8. Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
- Wash all surfaces with a lead-specific detergent, high-phosphate detergent, or other suitable cleaning
 agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every
 room is cleaned.
- 10. Repeat step 8. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed (see Chapter 11). Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not overexposed.
- 11. After final cleaning, perform a visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work. This visual examination should be performed by the owner or an owner's representative who is independent of the lead hazard control contractor.
- 12. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after the other construction work has been completed.
- 13. Paint or otherwise seal treated surfaces and interior floors.
- 14. Conduct a clearance examination (see Chapter 15).
- 15. If clearance is not achieved, repeat the final cleaning.



Step-by-Step Summary (continued)



- 16. Continue clearance testing and repeated cleaning until the dwelling achieves compliance with all clearance standards. As an incentive to conduct ongoing cleaning and a thorough final cleaning, the cost of repeated cleaning after failing to achieve clearance should be borne by the contractor as a matter of the job specification, not the owner.
- 17. Do not allow residents to enter the work area until cleaning is completed and clearance is established.
- 18. Cleaning equipment list:
 - HEPA vacuums.
 - Detergent.
 - Waterproof gloves.
 - Rags.
 - Sponges.
 - Mops.
 - Buckets.
 - HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs).
 - 6-mil plastic bags.
 - Debris containers.
 - Waste water containers.
 - Shovels.
 - Rakes.
 - Water-misting sprayers.
 - 6-mil polyethylene sheeting (or equivalent).





Chapter 14: Cleaning

I. Introduction

This chapter describes cleaning procedures to be employed following abatement and interim control work. Dust removal as an interim control measure is covered in Chapter 11.

All lead hazard control activities can produce dangerous quantities of leaded dust. Unless this dust is properly removed, a dwelling unit will be more hazardous after the work is completed than it was originally. Once deposited, leaded dust is difficult to clean effectively. Whenever possible, ongoing and daily cleaning of leaded dust during lead hazard control projects is recommended. Ongoing and daily cleaning is also necessary to minimize worker exposures.

Cleaning is the process of removing visible debris and dust particles too small to be seen by the naked eye. Removal of lead-based paint hazards in a dwelling unit will not make the unit safe unless excessive levels of leaded dust are also removed. This is true regardless of whether the dust was present before or generated by the lead hazard control process itself. Improper cleaning can increase the cost of a project considerably because additional cleaning and clearance sampling will be necessary. However, cleaning and clearance can be achieved routinely if care and diligence are exercised.

A. Performance Standard

Although the cleaning methods described in this chapter are feasible and have been shown to be effective in meeting clearance standards, other methods may also be used if they are safe and effective. This performance-oriented approach should stimulate innovation, reduce cost, and ensure safe conditions for both residents and workers.

B. Small Dust Particles

Dust particles that are invisible to the naked eye remain on surfaces after ordinary cleaning procedures. A visibly clean surface may contain high and unacceptable levels of dust particles and require special cleaning procedures.

C. Difficulties in Cleaning

While cleaning is an integral and essential component of any lead hazard control activity, it is also the most likely part of the activity to fail.

Several common reasons for this failure include low clearance standards, worker inexperience, high dust-producing methods, and deadlines.

1. Low Clearance Standards

Because very small particles of leaded dust are easily absorbed by the body when ingested or inhaled, a small amount can create a health hazard for young children. Therefore, "clearance standards" are extremely low for acceptable levels of leaded dust particles on surfaces after hazard control activities, and careful cleaning procedures are required. Although it is not possible to remove all leaded dust from a dwelling, it is possible to reduce it to a safe level.

Clearance standards are described more fully in Chapter 15. The permissible amount of leaded dust remaining on each of the following surfaces following lead hazard work is as follows:

- 100 μg/ft² on floors.
- 500 µg/ft² on interior window sills (stoots).
- 800 μg/ft² on window troughs (the area where the sash sits when closed).
- 800 µg/ft² on exterior concrete.

Those levels are based on wipe sampling. Clearance testing determines whether the premises or area are clean enough to be reoccupied after the completion of a lead paint hazard control project. A cleaned area may not be reoccupied until compliance with clearance standards has been established. To prevent delays, final testing and final cleaning activities should be coordinated.





2. Worker Inexperience

To understand the level of cleantiness required to meet the established clearance standards for hazard control cleanup, new hazard control personnel often require a significant reorientation to cleaning. Many construction workers are used to cleaning up only dust that they can see, not the invisible dust particles that are also important to remove.

3. High Dust-Producing Methods and/or Inadequate Containment

High dust-generating methods, inadequate containment during hazard control work, and poor work practices can all make achievement of clearance particularly difficult. Work practices necessary to prevent spreading of dust throughout a dwelling (e.g., by tracking dust out of work areas) are essential but sometimes tedious. Essential work practices are sometimes mistakenty considered to be "flexible guidelines" rather than necessary standards that are designed to ensure that the job is completed, not only safely, but also on time and within budget.

4. Deadlines

Daily and final cleanings have sometimes been compromised due to project deadlines, since cleaning comes at the end of the job. Hurried efforts often result in clearance failure. Delayed and over-budget hazard control. projects are often the result of repeated, unplanned recleanings that are necessitated by inadequate containment and sloppy work practices.

II. Coordination of Cleaning Activities

A. Checklist

The owner or contractor may use the following cleaning checklist before any lead hazard control activity:

- Is the critical importance of cleaning in a hazard control project understood?
- ✓ Have all workers been trained and certified. for hazard control work?

- ✓ Have the precleaning, daily, and final. cleanings been scheduled properly and coordinated with the other participants in the hazard control process?
- ✓ Have cleaning equipment and materials. been obtained?
- ✓ Do the workers know how to operate and. maintain special cleaning equipment, and do they have directions for the proper use of all cleaning materials?
- ✓ Have all workers carefully studied the. step-by-step procedures for precleaning (if needed), in-progress cleaning, and daily and final cleanings?
- Arc all workers properly protected during. the cleaning processes (see Chapter 9?
- Have provisions been made to properly. contain and store potentially hazardous debris (see Chapter 10)?.
- Have dust-clearance testing and related. visual inspections been arranged (see Chapter 15)?
- ✓ Are the clearance criteria to be met fully. understood?
- ✓ Have all appropriate surfaces been properly. painted or otherwise sealed?
- Have appropriate records been maintained. that document participants' roles in the hazard control project?

B. Equipment Needed for Cleaning

The following equipment is needed to conduct cleaning: high-efficiency particulate air (HEPA) vacuums and attachments (crevice) tools, beater bar for cleaning rugs), detergent, waterproof gloves, rags, sponges, mops, buckets, 6-mil plastic bags, debris containers, waste water containers, shovels, rakes, water-misting sprayers, and 6-mit polyethylene plastic sheeting (or equivalent).





C. Waste Disposal

Regulations governing hazardous and northazardous waste storage, transportation, and disposal affect both the daily and final cleaning procedures. The hazard control contractor and the disposal contractor should work together to establish formal written procedures, specifying selected containers, storage areas, and debris pickups, to ensure that all relevant regulations are met.

III. Cleaning Methods and Procedures

Many of the special cleaning methods and procedures detailed in this chapter are not standard operating procedure for general home improvement contractors. Therefore, project designers, responsible agencies, or owners must ensure that contractors follow the methods and procedures recommended herein or specially designed alternative procedures, even though some may appear to be redundant and unnecessary. These methods have been shown to be feasible and effective in many situations and skipping steps in the cleaning procedures can be counterproductive.

A. Containment

Because of the difficulty involved in the removal of fine dust, dust generated by hazard control work should be contained to the extent possible to the inside of work areas. Inadequately constructed or maintained containment or poor work practices will result in additional cleaning efforts, due to dust that has leaked out or been tracked out of the work area (see Chapter 8).

B. Basic Cleaning Methods: Wet Wash and Vacuum Cleaning Techniques

Because leaded dust adheres tenaciously, especially to such rough or porous materials as weathered or worn wood surfaces and masonry surfaces (particularly concrete), workers should be trained in cleaning methods. As a motivator,

some contractors have awarded bonuses to Workers who pass clearance the first time.

Two basic cleaning methods have proven effective, when used concurrently, in lead-based paint hatard control projects: a special vacuum cleaner equipped with a HEPA exhaust filter, followed by wet washing with special cleaning agents and rinsing, followed by a final pass with the HEPA vacuum.

Although HEPA filtered vacuums and trisodium phosphate (TSP) cleaners have been considered the standard cleaning tools for lead hazard control projects, new research, discussed under the "Alternatives Methods" section in this chapter, suggests that other tools and products may also be effective in efficiently cleaning dust while providing adequate worker protection from airborne exposure risks. Some of these innovations may even be superior.

1. HEPA Vacuuming

HEPA vacuums differ from conventional vacuums in that they contain high-efficiency filters that are capable of trapping extremely small, micron-sized particles. These filters can remove particles of 0.3 microns or greater from air at 99.97 percent efficiency or greater. (A micron is 1 millionth of a meter, or about 0.00004 inches.) Some vacuums are equipped with an ultra-low penetration air (ULPA) filter that is capable of filtering out particles of 0.13 microns or greater at 99.9995 percent efficiency. However, these ULPA filters are slightly more expensive, and may be less available than HEPA filters.

Vacuuming with conventional vacuum machines is unlikely to be effective, because much of the fine dust will be exhausted back into the environment where it can settle on surfaces. A recent Canadian study revealed that fine-dust air levels were exceedingly high when a standard portable vacuum with a new bag was used, although partially filled bags were found to be more efficient (CMHC, 1992). Considerations for the proper use of a HEPA vacuum are listed below.



Operating Instructions

There are a numerous manufacturers of HEPA vacuums. Although all HEPA vacuums operate on the same general principle, they may vary considerably with respect to specific procedures, such as how to change the filters. To ensure the proper use of equipment, the manufacturer's operating instructions should be carefully followed and if possible, training sessions arranged with the manufacturer's representative.

Although HEPA vacuums have the same "suction" capacity as ordinary vacuums that are comparably sized, their filters are more efficient. Improper cleaning or changing of HEPA filters may reduce the vacuum's suction capability.

Special Attachments

Because the HEPA vacuum will be used to vacuum surfaces other than floors, operators should buy attachments and appropriate tool kits for use on different surfaces—such as brushes of various sizes, crevice tools, and angular tools.

Selecting Appropriate Size(s)

HEPA vacuums are available in numerous sizes, ranging from a small lunchbucket-sized unit to track-mounted systems. Two criteria for size selection are the size of the job and the type of electrical power available. Manufacturer recommendations should be followed.

Wet-Dry HEPA Vacuums

Some hazard control contractors have found the wet-dry HEPA vacuums to be particularly effective in meeting clearance standards. These vacuums are equipped with a special shut-off float switch to protect the electrical motor from water contact.

Prefilters

HEPA filters are usually used in conjunction with a prefilter or series of prefilters that trap the bulk of the dust in the exhaust airstream, particularly the larger particles. The HEPA filter traps most of the remaining small particles that have passed through the prefilter(s). All filters must be maintained and replaced or

cleaned as specified in the manufacturer's instructions. Failure to do so may cause a reduction in suction power (thus reducing the vacuum's efficiency and effectiveness). Failure to change prefilters may damage the vacuum motor and will also shorten the service tife of the HEPA filter, which is far more expensive than the prefilters.

HEPA Vacuuming Procedures

Surfaces frequently vacuumed include ceilings, walls, floors, windows, interior and exterior sills, doors, heating, ventilation, and air conditioning (HVAC) equipment (heating diffusers, radiators, pipes, vents), fixtures of any kind (light, bathroom, kitchen), built-in cabinets, and appliances.

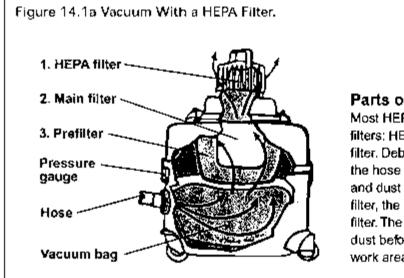
To aid in dislodging and collecting deep dust and lead from carpets, the HEPA vacuum must be equipped with a beater bar (agitator head) that is fixed to the cleaning head. This bar should be used on all passes on the carpet face during dry vacuuming (see Chapter 11 for details on carpet and furniture cleaning).

All rooms and surfaces should be included in the HEPA vacuum process, except for those that (1) were found not to have lead-paint hazards and were properly separated from work areas before the process began (see Chapter 8), or (2) were never entered during the process. Porches, sidewalks, driveways, and other exterior surfaces should be vacuumed if exterior hazard control work was conducted, or if debris was stored or dropped outside. Vacuuming should begin on the ceitings and end on the floors, sequenced to avoid passing through rooms already cleaned, with the dwellings' entryway cleaned last.

Emptying the HEPA Vacuum

Used filters and vacuumed debris are potentially hazardous waste and should be treated accordingly (see Chapter D). Therefore, operators should use extreme caution when opening the HEPA vacuum for filter replacement or debris removal to avoid accidental release of accumulated dust into the environment. This may occur, for example, if the vacuum's seal has been broken and the vacuum's bag is disturbed.





Parts of a HEPA-vacuum

Most HEPA-vacuums have three filters: HEPA filter, main filter, and prefilter. Debris gets sucked in through the hose into the vacuum bag. The air and dust get filtered through the prefilter, the main filter, and the HEPA filter. The HEPA filter captures the lead dust before the air is released into the work area again.

Operators should also wear a full set of protective clothing and equipment, including appropriate respirators, when performing this maintenance function, which should be done in the containment area or offsite.

2. Wet Detergent Wash

Several types of detergents have been used. to remove leaded dust. Those with a highphosphate content (containing at least 5 percent trisodium phosphate, also known as TSP) have been found to be effective when used as part of the final cleaning process (Milar, 1982). TSP detergents are thought to work by coating the surface of dusts with phosphate or polyphosphate groups which reduces electrostatic interactions with other surfaces and thereby permits easier removal. Because of environmental concerns some States have restricted the use of TSP, and some manufacturers have eliminated phosphates from their household detergents. However, high-TSP detergents can usually be found in hardware stores and may be permitted for limited use, such as lead hazard control.

Other non-TSP cleaning agents developed specifically for removing leaded dust have also been found to be effective (possibly more effective than TSP) in limited trials by several

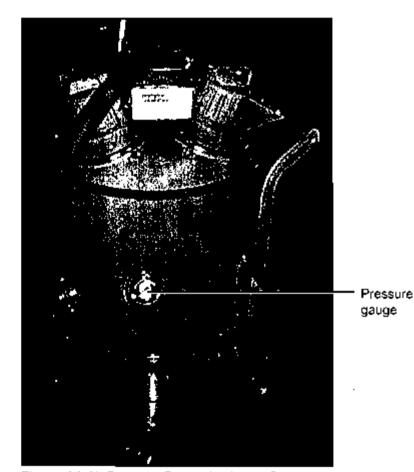
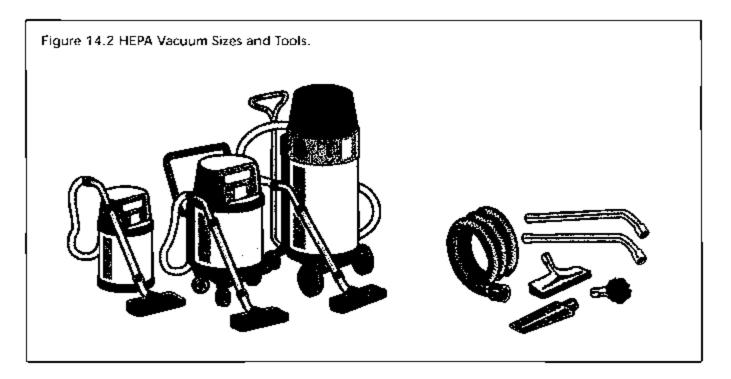


Figure 14.1b Pressure Gauge Indicator Shows When Filters Require Changing.







investigators (Grawe, 1993; Wilson, 1993) and may also be safer, since TSP is a skin and eye irritant. See section VII for more information on non-TSP detergents. Proper procedures for using high-phosphate detergents also apply to most other types of detergents and include the following steps:

Manufacturer's Ditution Instructions

Users of cleaning agents for leaded dust removal should follow manufacturer's instructions for the proper use of a product, especially the recommended dilution ratio. Even diluted, trisodium phosphate is a skin irritant and users should wear waterproof gloves. Eye protection should also be worn, and portable eyewash facilities should be located in or very near the work area. Consult manufacturer's directions for the use of other detergents.

Appropriate Cleaning Equipment

Because a detergent may be used to clean leaded dust from a variety of surfaces, several types of application equipment are needed, including cleaning solution spray bottles, wringer buckets, mops, variously sized hand aponges, brushes,

and rags. Using the proper equipment on each surface is essential to the quality of the wetwash process.

Proper Wet-Cleaning Procedures

At the conclusion of the active lead hazard control process and the initial HEPA vacuuming, all vacuumed surfaces should be thoroughly and completely washed with a high-phosphate solution or other lead-specific cleaning agent (or equivalent) and rinsed. Select a detergent that does not damage existing surface finishes (TSP may damage some finishes). Work should proceed from ceilings to floors and sequenced to avoid passing through rooms already cleaned.

Changing Cleaning Mixture

Many manufacturers of cleaners will Indicate the surface area that their cleaning mixture will cover. To avoid recontaminating an area by cleaning it with dirty water, users should follow manufacturer-specified surface-area limits. However, regardless of manufacturers' recommendations, the cleaning mixture should be changed after its use for each room. As a rule of thumb, 5 gallons should be used to clean no

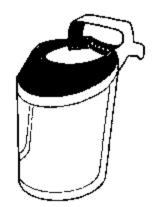




Figure 14.3 Goggles, Face Shields, Gloves, and Eye Wash Facilities Should Be Available When Used With Chemicals Such as TSP.













Latex

Neoprene

Nitrile

more than 1,000 square feet. Used cleaning mixture is potentially hazardous waste (see Chapter 10); consult with your local water and sewage utility for directions on its proper disposal. Wash water should never be poured onto the ground. The wash water is usually filtered and then poured down a toilet (if the local water authority approves).

3. The HEPA/Wet Wash/HEPA Cycle

Typical Procedures

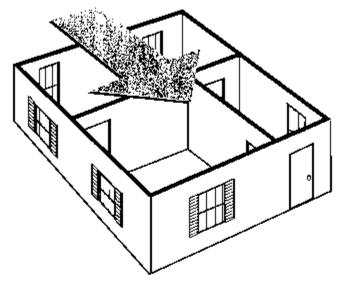
The usual cleaning cycle that follows lead hazard control activities is called the HEPA vacuum/wet wash/HEPA cycle and is applied to an entire affected area as follows;

First, the area is HEPA vacuumed.

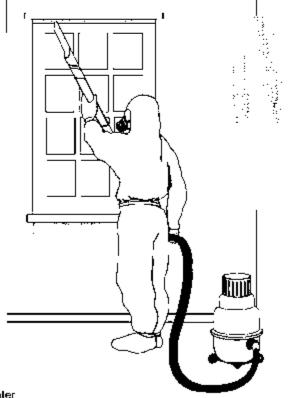


Figure 14.4a The HEPA Vacuum, Wet Wash, HEPA Vacuum Cycle Helps in Meeting Clearance Standards.

HEPA vacuum all surfaces Start at the end farthest from the main entrance/exit. As you vacuum, move towards the main exit and finish there.



Begin at the top of each room and work down. For example, start with the top shelves, the top of the woodwork, and so on, and work down to the floor. Do every inch of the windows, especially the window troughs.



Courtesy: Alice Hamilton Occupational Health Center





- Next, the area is washed down.
- After drying, the area is again HEPA vaçuumed.

The rationale for this three-pass system is as follows:

- The first HEPA vacuum removes as much. dust and remaining debris as possible.
- The wet wash further dislodges dust from surfaces.
- The final HEPA cycle removes any remaining particles dislodged but not removed by the wet wash.

Single-Pass Wet Wash/HEPA Vacuum

Some lead hazard control contractors have found HEPA spray cleaner vacuums to be a cost-effective alternative to the three-pass system. Similar to home carpet-cleaning machines, these vacuums simultaneously deliver a solution to the surface and recover the dirty solution. Theoretically, this process combines two of the steps in the HEPA vacuum/wet wash/HEPA cycle into one step. While anecdotal evidence indicates that the spray cleaner wet wash/HEPA is effective for some uses. limitations have been noted in its use for ceilings, vertical surfaces. and hard to reach areas. This device may be used as long as clearance standards are met.

Figure 14.4b (continued).

Use special attachments

Use the rubber cone where the floor meets the baseboard and along all the cracks in the floor boards. Use the brush tool for walls and woodwork.

Use the wheeled floor nozzle for bare floors and the carpet beater for rugs.

Move slowly

Vacuum slowly so the HEPA vacuum can pick up all the lead dust.



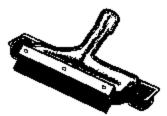
Rubber Cone



Dust Brush



Powered Carpet Beater



Wheeled Floor Nozzle



Figure 14.4c (continued)

Wash all surfaces with suitable detergents

Wash all surfaces in the work area with suitable detergents, including areas that had been covered with plastic. Some wallpaper should only be HEPA vacuumed, since it may be damaged by the detergent.



Wipe All Surfaces



Wet Mop Floor



Don't Dry Sweep



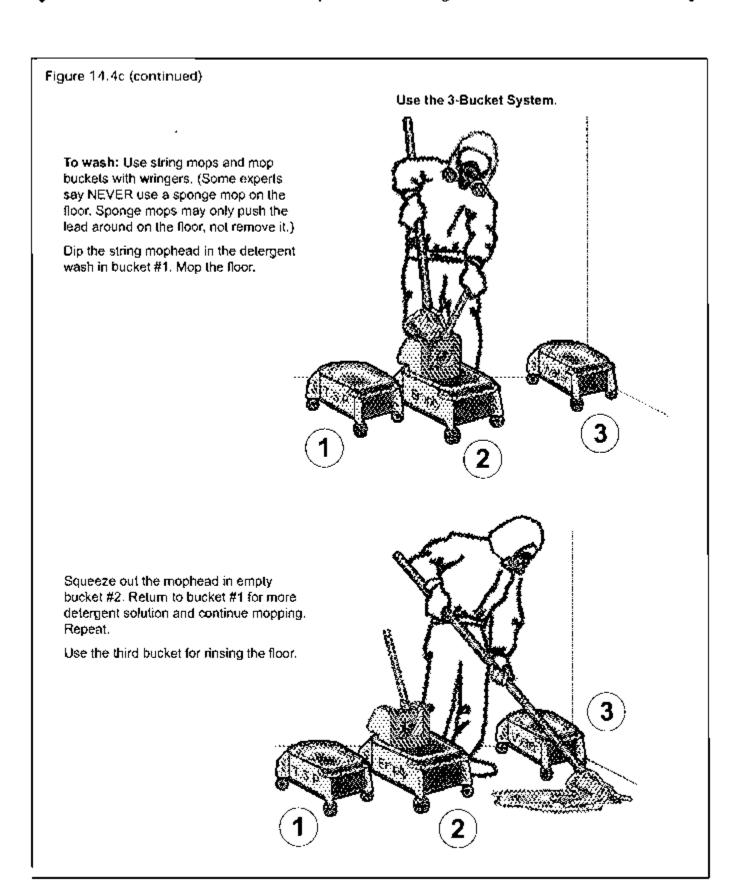
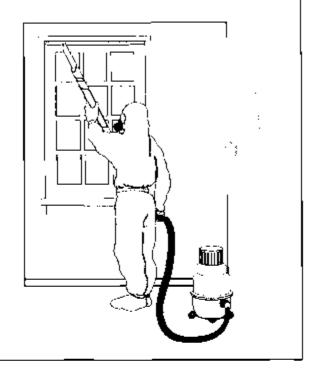




Figure 14.4d (continued)

HEPA vacuum all surfaces a final time HEPA vacuum all surfaces in the work area, including areas that had been covered with plastic.

Starting at the far end, work towards the decontamination area. Begin with ceilings or the top of the walls and work down, cleaning the floors last. Do every inch of the windows, especially the troughs. Use the corner tool to clean where the floor meets the baseboard and all the cracks in the floor boards. Use the brush tool for the walls. Move slowly and carefully to get all the dust.



4. Sealing Floors

Before clearance, all floors without an intact, nonporous coating should be coated. Sealed surfaces are easier for residents to clean and maintain over time than those that are not sealed. Wooden floors should be sealed with a clear polyurethane or painted with deck enamel or durable paint. Vinyl tile, kinoleum, and other similar floors should be sealed with an appropriate wax. Concrete floors should be sealed with a concrete sealer or other type of concrete deck enamel. However, if these floors are already covered by an effective coat of sealant, it may be possible to skip this step.

As an alternative to sealing, floors may be covered with new vinyl tile, sheet vinyl, linoleum flooring, or the equivalent to create a more permanent cleanable surface. New surfaces should be cleaned with a cleaning solution that is appropriate for that type of surface.

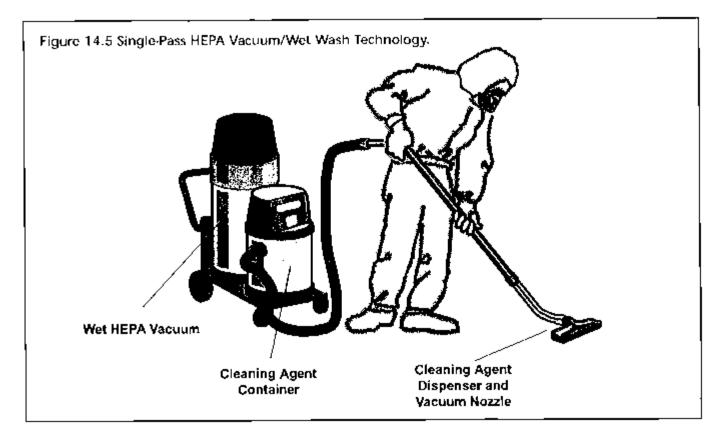
IV. Order of Cleaning Procedures During Lead Hazard Control

The special cleaning procedures to be followed during a lead-based paint hazard control project are discussed in chronological order below. Skipping steps in the process may result in failure to meet post-lead hazard control clearance standards.

A. Precleaning Procedures

Precleaning (i.e., cleaning conducted before lead hazard control is begun) is necessary only in dwelling units that are heavily contaminated with paint chips. Precleaning involves the removal of large debris and paint chips, followed by HEPA vacuuming. These steps may be followed by removal of occupant personal possessions, furniture, or carpeting, depending on the





Worksite Preparation Level selected (see Chapter 8). If the furniture will not be cleaned, it should be removed from the area or covered with plastic prior to beginning the precleaning procedure. Carpeting should always be misted before its removal to control the generation of hazardous dust.

It is usually the resident's responsibility to remove most of his or her personal possessions. However, if necessary, owners or project management should be prepared to complete this activity before lead hazard control work begins. As a last resort, the contractor may pack any remaining belongings and carefully seal and move the boxes, supplying all necessary boxes, packing materials, and staff to complete the task. Following cleaning and clearance, the contractor should return all packed items to their appropriate places. Leaving these tasks to the contractor may be expensive and inefficient, since the contractor will need to be insured for this function if the occupant's

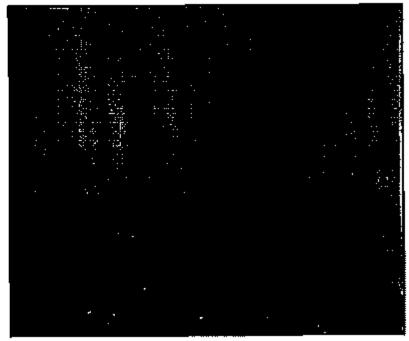


Figure 14.6 Precleaning Is Needed in Areas Where Contamination and Deterioration Are High.





belongings are damaged. Additionally, moving furniture, rugs, drapes, and other items owned by the occupant could increase leaded dust levels. Clearance should be conducted after cleaning but before resident items are moved back in.

B. Ongoing Cleaning During the Job

Periodic HEPA vacuoming during the lead hazard control work may be necessary to minimize tracking of dust and paint chips from one area to another (e.g., when a large amount of paint chips or dust is being generated).

C. Daily Cleaning Procedures

Cleaning activity should be scheduled at the end of each workday when all active lead hazard control throughout the dwelling has ceased. Sufficient time must be allowed for a thorough and complete cleaning (usually about 30 minutes to an hour). Daily cleaning helps achieve clearance dust levels by minimizing problems that may otherwise occur during final cleaning and limiting worker exposures. While daily cleaning can be skipped in vacant dwelling units, it is required when occupants will



Figure 14.7 Plastic Sheeting Should Be Repaired as Part of Daily Cleanup.

return in the evening. Under no circumstances should debris or plastic be left outside overnight in an unsecured area, even if the dwelling is vacant. Daily cleaning should consist of:

- · Removing large debris.
- Removing small debris.
- HEPA vacuuming, wet clean, HEPA vacuuming (horizontal surfaces only).
- Cleaning exterior.
- Patching and repairing plastic sheeting.
- Securing debri√ptastic.

Large Debris

Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to a secure area on the property designated for waste storage. All sharp corners, edges, and nails should be hammered down to prevent injury and minimize the tearing of plastic. It is not necessary to wrap each individual piece of debris in plastic if the entire load can be wrapped. A secure area either outside or inside the property must be designated as a temporary waste-storage area. Covered, secured, and labeled dumpsters placed on or near the property may be used. Proper segregation of waste should be enforced at this time (see Chapter 10).

2. Small Debris

After being misted with water, small debris should be swept up, collected, and disposed of properly. The swept debris should be placed in double 4-mil or single 6-mil polyethylene (or equivalent) plastic bags, properly sealed, and moved to the designated trash storage area. Trash bags should not be overloaded; overloaded bags may rupture or puncture during handling and transport.

3. Exterior Cleaning

Areas potentially affected by exterior lead hazard control should be protected via a containment system (see Chapter 8). Because weather can adversely affect the efficacy of exterior



containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleaning, the immediate area should be examined visually to ensure that no debris has escaped containment. Any such debris should be raked or vacuumed and placed in single 6mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris. HEPA vacuumino is appropriate for hard exterior surfaces, not soil.

4. Worker Protection Measures

General worker protection measures are discussed in Chapter 9. Studies indicate that during daily cleaning activities, especially while wet sweeping, workers may be exposed to high levels of airborne dust. Therefore, workers should wear protective clothing and equipment, especially appropriate respirators.

5. Maintaining Containment

The integrity of the plastic sheeting used in a lead hazard control project must be maintained. During their daily cleaning activities, workers should monitor the sheeting and immediately repair any holes or cips with 6-mil plastic and duct tape.

V. Order of Final Cleaning Procedures After Lead Hazard Control

Before treated surfaces can be painted or sealed, final cleaning procedures must be completed. Because airborne dust requires time to settle, the final cleaning process should start no sooner than I hour after active lead hazard control has ceased in the room. See Appendix 11 for details regarding dust settling.

A. Final Cleaning

As the first stage in the final cleaning, floor plastic should be misted and swept as detailed earlier in this chapter. Upper-level plastic, such as that on cabinets and counters, should be removed first, after it has been misted with water and cleaned. All plastic should be folded

carefully from the cornervends to the middle to trap any remaining dust. Next, remove both layers of plastic from the floor.

Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after the cleaning and removal of other plastic sheeting; these sheets may then be misted, cleaned, and removed last.

Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags. with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plasticremoval process usually requires workers to use protective clothing and respirators.

After the plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle, starting with the ceiling and working down to the floor. After surfaces are repainted or sealed, a final HEPA/wet wash/HEPA cycle may be necessary if accumulated dust caused by other work is visible.

1. Decontamination of Workers. Supplies, and Equipment

Decontamination is necessary to ensure that worker's families, other workers, and subsequent properties do not become contaminated. Specific procedures for proper decontamination of equipment, tools, and materials prior to their removal from lead hazard control containment areas should be implemented, as described below and in Chapters 9 and 10.

Work clothing, work shoes, and tools should not be placed in a worker's automobile unless they have been laundered or placed in scaled bags. All vacuums and tools that were used should be wiped down using sponges or rags with detergent solutions.

Consumable/disposable supplies, such as mopheads, sponges, and rags, should be replaced. after each dwelling is completed. Soiled items should be treated as contaminated debris (see Chapter 10).







Figure 14.8a Pick Up Corners of Plastic Sheeting.



Figure 14.8b Fold Plastic Inward.

Durable equipment, such as power and hand tools, generators, and vehicles, should be cleaned prior to their removal from the site: the cleaning should consist of a thorough. HEPA vacuuming followed by washing.

B. Preliminary Visual Examination

After the preliminary final cleaning effort is completed, the certified supervisor should visually evaluate the entire work area to ensure that all work has been completed and all visible dust and debris have been removed. While the preliminary examination may be performed by the lead hazard control supervisor, contractor, or owner as a preparatory step before the final clearance examination, it does not replace the independent visual assessment conducted during clearance.

If the visual examination results are unsatisfactory, affected surfaces must be retreated and/or recleaned. Therefore, it is more cost effective to have the supervisor rather than the clearance examiner perform this initial examination.

C. Surface Painting or Sealing of Nonfloor Surfaces

The next step of the cleaning process is painting or otherwise scaling all treated surfaces. except floors.

Surfaces, including walls, ceilings, and woodwork, should be coated with an appropriate primer and repainted. Surfaces enclosed with vinyl, aluminum coil stock, and other materials traditionally not repainted are exempt from the painting provision.

D. Final Inspection

The final clearance evaluation should take place at least 1 hour after the final cleaning. Clearance has three purposes: 1) to ensure that the lead hazard control work is complete, 2) to detect the presence of leaded dust, and 3) to make sure that all treated surfaces have been repainted or otherwise sealed. Clearance is usually performed after the scalant is applied. to the floor. See Chapter 15 for information. on clearance examination procedures.

E. Recleaning After Clearance

If after passing the final visual examination, the dwelling unit fails the clearance wipe dust tests,



the HEPA/wet wash/HEPA cleaning cycle should be carefully and methodically repeated. Failure is an indication that the cleaning has not been successful. Recleaning should be conducted under the direct supervision of a certifled supervisor. Care should be exercised during the recleaning of "failed" surfaces or components to avoid recontaminating "cleared" surfaces or components.

VI. Cleaning Cost Considerations

An important consideration in determining lead hazard control strategies and methods is the cost and difficulty of required daily and final cleanup operations and the case with which one can meet dust-clearance standards. A general rule of thumb is that lead hazard control strategies that generate the most dust will have higher cleanup costs and higher initial clearance test-failure rates.

A. Initial Clearance Test Failure Rates

The likelihood of passing final dust-clearance tests is highly correlated with the chosen intervention strategy, methods, and care exercised by the contractor. For example, in one study (HUD, 1991) initial wipe-test failure rates were 14 percent for interior window sills, 19 percent for floors, and 33 percent for window troughs. The pass/fail rates for each surface were strongly associated with the dwelling unit abatement strategy employed. Chemical removal and hand-scraping strategies experi-enced higher failure rates than replacement and encapsulation/enclosure strategies (see Table 14.1).

However, results of the HUD demonstration project indicated that clearance failure is not solely related to abatement method. The report stated that "the diligence and effectiveness of an abatement contractor's cleaning process ... had a major impact on ... the likelihood of the dwelling unit to pass the final wipe test clearance" (HUD, 1991).



Figure 14.8c Dispose of Plastic Sheeting in a Plastic Trash Bag.

B. Key Factors In Effective Cleaning

Effective cleaning will be aided by adequate sealing of surfaces with polyethylene sheeting. prior to lead hazard control, proper daily cleaning practices, good worker training, and attention to detail. Where poor worksite preparation is employed, additional cleaning may be required to meet clearance.

C. Special Problems

Surfaces such as porous concrete, old porous hardwood floors, and areas such as corners of rooms and window troughs pose especially difficult cleaning challenges. Porous concrete and corners of rooms normally require additional vacuuming to achieve an acceptable level of cleanliness.

The lead hazard control strategy of enclosure is frequently chosen for window troughs and for old porous hardwood floors due to the difficulty of adequately cleaning these surfaces. This



option provides not only a clean surface but a more permanently cleanable surface for dwelling occupants to maintain.

VII. Alternative Methods

Alternatives to the recommended cleaning tools and practices discussed in this chapter are available, some having significant potential for increasing effectiveness and lowering costs.

A recent Canadian study (CMHC, 1992) evaluated the effectiveness of contaminated dust cleanup activities using tools that would generally be available to construction contractors and homeowners. Vinyl flooring and carpeting were cleaned using several wet/dry vacuuming systems, sweeping, and wet mopping. The study found that regular vacuums with empty bags send a steady stream of fine particles into the air, while vacuums with partially filled bags were more efficient. This finding suggests the necessity for HEPA vacuums. Other vacuums may be used if workers do not experience increased exposures, if compliance with clearance standards is achieved, and if a variance from OSHA regulation (29 CFR 1926.62 (h)(4)) is obtained by the contractor or employer (if required).

Agitator heads on vacuums were demonstrated to significantly enhance vacuum effectiveness on carpets in cleaning up fine dust without

increasing airborne dust levels. Table 14.2 suggests that a central vacuum with an agitator head is most efficient at removing dust and minimizing recontamination, probably because the vacuum exhaust is blown away from living areas. Because many houses do not have central vacuuming systems, a portable HEPA vacuum is the next best choice (see Table 14.2), Vacuums without agitator heads appeared to perform relatively poorly on carpets.

A. Vacuums

Regular (non-HEPA) dry vacuums potentially. produce hazardous levels of airborne dust and therefore should be avoided. Externally exhausted vacuum units with adequate dustretaining capability may be used. The OSHA lead standard requires the use of HEPA vacuum. equipment (see 29 CFR 1926.62 (h)(4), which states, "where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters").

B. Trisodium Phosphate and Other Detergents

TSP detergents have been used successfully for a number of years in lead hazard control work. However, in recent years, other new cleaning agents have been developed specifically for leaded dust removal. The need for alternatives has been fueled by the fact that TSP is an eye.

Table 14.1 Initial Cleaning Wipe-Test Failure Rates for Various Abatement Strategies

Dust Test Location	Hand Scrape w/Heat Gun	Chemical Removal	Enclosure	Encapsulation	Replacement	All Methods
Floors	28.8%	22.7%	20.0%	13,8%	12.5%	19%
Sills	24.4%	24.1%	8.2%	4.8%	17.4%	14%
Wells	44.5%	45.7%	23.7%	25.7%	21.0%	33%

Source: U.S. Department of Housing and Urban Development (August 1991) The HUD Lead-Based Paint Abatement Demonstration (FHA)





and skin irritant and is increasingly restricted from household use and unavailable in many local jurisdictions. TSP also damages some finishes. Recently reported trials of two new products suggest that alternative lead-specific cleaning agents may be more effective and safer than TSP (Grawe, 1993; Wilson, 1993).

These Guidelines do not prohibit the use of non-TSP cleaning agents. HUD encourages further evaluation of alternative cleaning methods. Use of any cleaning agent that results in compliance with clearance criteria is encouraged.

Table 14.2 Mass Removal Efficiency for Extended Vacuuming Cycles

		Mass Removal Effici	ency Percentages			
Cycle Number	Cleaning Method					
	Central Vacuum—Plain Tool	Central Vacuum—Agitator Head	HEPA Vacuum	Portable Vacuum—Plain Tool		
1	34.7	71.0	55.4	17.5		
2	47.0	80.2	61.2	23.0		
3	51.9	85.9	66.3	26.6		
4	56.0	87.8	67.0	29.4		
5	59.3	88.9	72. 1	32.5		
6	61.6	91.2	74.4	34.9		
7	63.8	93.1	76.4	36.5		
8	67.5	95.4	77.5	38.1		
9	67.5	97.7	78.7	40.1		
10	67.2	100.0	80.2	41.7		
11		102.3	80.2	41.7		
12		104.6	84.1	44.8		
13		104.6	84.5	46.8		
14		103.8	84.5	48.4		
15				49.6		
16				50.8		
17				52.4		
18				53.6		
19				54,4		
20				55.2		

Source: Canada Mortgage and Housing Corporation: Saskatchewan Research Council (December 1992) Effectiveness of Clean-up Techniques for Leaded Paint Dust

MDARNG Facilities III Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX F

MOLD GUIDANCE

Army Facilities Management Information Document on Mold Remediation

TG 277 FEBRUARY 2002

Issues



ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

Moisture Control: The Army Way to Mold Prevention!

INTRODUCTION

Concern about indoor exposure to mold has been increasing as the public becomes more aware that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions.

This document provides the best and most current guidance for remediation of clean water damage (<48 hours) and mold contamination (>48 hours) into one resourceful Army guide. This guide has been designed to provide information to facilities management individuals who have little or no experience with mold remediation. It will assist them in making a reasonable judgment as to whether the situation can be handled in-house. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor. If an outside contractor is employed, they must have experience cleaning up mold. Check their references, and have them follow the recommendations presented in this document, EPA guidelines, and/or guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH). A multi-disciplinary team approach to mold concerns is best. A health and safety professional, such as an industrial hygienist, should be consulted prior to any remediation activities to assist in the project.

Molds produce tiny spores to reproduce. Mold spores float through the indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.(1)

In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur. Any initial water infiltration should be stopped and clean up began immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. (Refer to Appendix A for detailed guidance on clean water damage response). If the source of water is elevated humidity, actions to maintain the relative humidity levels below 60% to inhibit mold growth should be taken (2). Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

MOLD PREVENTION TIPS:

[Adapted from EPA, reference 1]

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilating, and air-conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

REMEDIATION PLANNING

- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Select cleanup methods for moldy items (Appendix B)
- Select Personal Protection Equipment (PPE)- protect remediators (Appendix B)
- Select containment equipment protect building occupants (Appendix B)
- Select remediation personnel who have the experience and training needed to implement the remediation plan and use PPE and containment as appropriate

REMEDIATE MOISTURE AND MOLD PROBLEMS

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Clean and dry moldy materials (Appendix B)
- Discard moldy porous items that can't be cleaned (Appendix B)

REMEDIATION PROCEDURES

Four levels of abatement are described below. The size of the area impacted by mold contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of mold and preventing dust contaminated with mold from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. (3)

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work. (1 and 3)

The use of bleach or other biocides is questionable in most cases (8). The effectiveness of bleach in reducing living mold is dependent on concentration, residual chlorine levels, and contact time on the surface (8). All of these factors are difficult to control during remediation. Removal of all mold growth can generally be accomplished by physical removal of materials supporting active growth and thorough cleaning of non-porous materials (4). Therefore, application of a biocide serves no purpose that could not be accomplished with a detergent or cleaning agent (4).

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."(4)

FOUR REMEDIATION LEVELS

[Adapted from NYCDOH Guidelines on Assessment and Remediation of Fungi in Indoor Environments (3) and EPA (1)]

Level I: Small Isolated Areas – Total surface area affected less than 10 square feet - e.g., ceiling tiles, small areas on walls. Refer to Appendix B for detailed guidance.

Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (c.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Level II: Medium – Total Surface Area affected between 10 and 100 square feet - e.g., several wallboard panels. (See Appendix B for detailed guidance).

The following procedures at a minimum are recommended:

Refer to Appendix C for proper PPE selection. Limited or Full protection may be required depending on the situation.

Refer to Appendix D for Containment procedures.

The work area and areas directly adjacent should be covered with a single layer of 6 mil fire-retardant polyethylene sheet(s) and taped before remediation, to contain dust/debris.

Seal ventilation ducts/grills in the work area and areas directly adjacent with 6 mil polyethylene sheeting. Use an exhaust fan with a High Efficiency Particulate Air (HEPA) filter to generate negative pressurization.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and surrounding areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level III be followed.

Level J11: Large Area – Total Surface Area affected greater than 100 square feet or potential for increased occupant or remediator exposure during remediation is estimated to be significant. (See Appendix B for detailed guidance).

The following procedures are recommended:

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from occupied spaces using double layers of polyethylene plastic sheeting scaled with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be scaled and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air(4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If any remediation sampling is deemed necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AlHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

Level IV: Remediation of HVAC Systems (See Appendix B for detailed guidance. For a small area (<10 ft²) follow Level I guidance for PPE and containment and for a areas (>10 ft²) follow Medium (Level II) or when greater than 100 ft² follow Large (Level III) guidance for PPE and containment as discussed in Appendices B, C, and D)

A Small Isolated Area of Contamination (total surface area affected <10 square feet) in the HVAC System

The HVAC system should be shut down prior to any remedial activities.

Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended (7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Growth supporting materials that are contaminated, such as the insulation of interior lined duets and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Areas of Contamination (Total surface area affected >10 square feet) in the HVAC System

The following procedures are recommended:

The HVAC system should be shut down prior to any remedial activities.

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from other areas. Isolate the HVAC system using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be scaled and removed in double-bagged 6-mil plastic. When a decontamination room is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

All areas should be left dry and visibly free from contamination and debris.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air (4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If remediation sampling is necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HAZARD COMMUNICATION

When mold growth requiring Level III or IV (large-scale) remediation is found, the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners (1 and 3).

CONCLUSION

In summary, the prompt remediation of contaminated material and infrastructure repair must be the primary response to mold contamination in buildings. The simplest and most expedient remediation that properly and safely removes mold growth from buildings should be used. Widespread contamination poses much larger problems that must be addressed on a case-by-case basis in consultation with a health and safety specialist. Effective communication with building occupants is an essential component of all remedial efforts. Individuals with persistent health problems should go to the local occupational health clinic or see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures.

REFERENCES

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- 8. American Industrial Hygiene Association, Report of Microbial Growth Task Force, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

Water Damage Cleanup and Mold Prevention

Appendix A presents strategies to respond to water damage within 24-48 hours. These guidelines are designed to help avoid the need for remediation of mold growth by taking quick action before growth starts. If mold growth is found on the materials listed in Appendix A, refer to Appendix B for guidance on remediation. Depending on the size of the area involved and resources available, professional assistance may be needed to dry an area quickly and thoroughly.

Water Damage - Cleanup and Mold Prevention			
Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mold Growth£			
Water-Damaged Material†	Actions		
Books and papers	 For non-valuable items, discard books and papers. Photocopy valuable/important items, discard originals. Freeze (in frost-free freezer or meat locker) or freeze-dry. 		
Carpet and backing - dry within 24-48 hours§	 Remove water with water extraction vacuum. Reduce ambient humidity levels with dehumidifier. Accelerate drying process with fans. 		
Ceiling tiles	Discard and replace.		
Cellulose insulation	Discard and replace.		
Concrete or cinder block surfaces	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. 		
Fiberglass insulation	Discard and replace.		

Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	 Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. Check to make sure under flooring is dry; dry under flooring if necessary. 	
Non-porous, hard surfaces (Plastics, metals)	Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.	
Upholstered furniture	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture. 	
Wallboard (Drywall and gypsum board)	 May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible. 	
Window drapes	Follow laundering or cleaning instructions recommended by the manufacturer.	
Wood surfaces	 Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. Wet paneling should be pried away from wall for drying 	

£ If mold growth has occurred or materials have been wet for more than 48 hours, consult Appendix B. Even if materials are dried within 48 hours, mold growth may have occurred. Professionals may test items if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then OSHA may have requirements for Personal Protective Equipment and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do inot use fans before determining that the water is clean or sanitary.

- † If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.
- § The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

		for Remediating Building Materia Growth Caused by Clean Water*	
Material or Furnishing Affected	Cleanup Methods?	Personal Protective Equipment	Containment
S	MALL - Fotal S	urface Area Affected Less 1 han 10 square fee	n (fC)
Hooks and papers	3		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Carpet and backing	1, 3]	
Concrete or rinder block	1, 3] 1	
Hard surface, porous flooring (linoleum, ecramic tile, vinyl)	1,2,3	Minimum N-95 respirator, gloves, and goggles	
Non-porting, hard surfaces (plastics, metals)	t. 2, 3		None required
Upholytered furniture & drapes	1,3		
Walibnard (drywall and gypsum buard)	3]	
Wood surfaces	1,2,3]	

MEDIUM - Total Surface Area Affected Between 10 and 100 ft ²					
Brooks and papers	3				
Carpet and backing	1,3,4				
Concrete or cinder block	1,3				
Hard surface, porous flooring (linoleum, ecramic tile, vanyl)	1.2,3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider patential für remediatur/necupant exposure and size of contaminated are		
Non-porous, bard surfaces (plastics, nietals)	12,3				
Upholstered forming & drapes	1,3,4				
Waliboard (drywali and gypsum board)	3,4				
Wood surfaces	1,2,3	7			

LARGE - Total Surface Area Affected Greater Than 100 ft² or Potential for Increased Occupant or Remediator Exposure During Remediation. Estimated to be Significant

Books and papers	.3		
Carpet and backing	1,3,4	-	
Concrete or cinder black	1,1	Full	Pull
Hard surface, possess flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider	Use professional judgment, consider
Non-parous, hard surfaces (plastics, metals)	1,2,3	potential for remediator/occupant exposure and size of contaminated area	potential for remediator exposure and size of contaminated area
Upholstered furniture & drapes	1,2.4]	
Wallboard (drywall and дуужит board)	3,4]	
Wood surfaces	1.2,3,4		

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. Consult Appendix A if materials have been wet for less than 48 hours, and mold growth is not apparent. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

*Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will
 remain in the material but will not grow if the material is completely dried). Steam cleaning
 may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside
 of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and
 covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block
 supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber.
 Maintain area under negative pressure with HEPA filtered fan exhausted outside of building.
 Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator
 (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles
 in the air. Note that half-face APRs do not provide eye protection. In addition, the
 HEPA filters do not remove vapors or gases. You should always use respirators
 approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a
 breathable material, such as TYVEK®, should be used. All gaps, such as those
 around ankles and wrists, should be sealed (many remediators use duct tape to seal
 clothing).

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above

the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely scaled and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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February 2002

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Industrial Hygiene/ Preventive Medicine Mold Assessment Guide

TG 278 February 2002



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Industrial Hygiene/Preventive Medicine Mold Assessment Guide

Introduction

The USACHPPM Industrial Hygiene Field Services Program receives requests from industrial hygiene (IH)/preventive medicine (PM) field personnel for information about mold investigations and clean-up procedures. Like all organisms, molds have an absolute requirement for water. The types of mold and their abundance in an area depend on the availability of nutrients (i.e., dirt), water and temperature. Chronic water intrusion, lack of adequate ventilation and moisture control, and or isolated floods, such as a water pipe bursting, are typical conditions, which lead to mold growth in buildings.

When mold growth is present, the removal and cleaning of contaminated materials must be handled with proper precautions, because disturbing this growth can result in bioaerosol release, i.e., sending millions of spores into the air.

This mold assessment guide used in conjunction with the ARMY Facilities Management Information Document on Mold Remediation Issues (TG 277)¹ will assist Industrial Hygienists and or Preventive Medicine personnel in conducting mold investigations. Since a team approach is recommended, the collaboration between IH/PM personnel and facility management personnel is vital to correct moldy conditions and prevent future mold growth. Use the following procedures and refer to Appendix A: Mold Investigation Decision Logic, for guidance on mold investigation, evaluation, and remediation for routine assessments.

Air sampling for mold should never be part of a routine assessment. Remediation strategies can generally be made on the basis of a visual inspection or confirmation with a bulk or surface sample. In addition, air sampling methods for some mold are prone to false negative results and therefore cannot be used to definitively rule out contamination².

Safety Tips While Investigating and Evaluating Mold and Moisture Problems³

- Be careful not to touch mold or moldy items with bare hands.
- Do not allow mold or mold spores to get into your eyes.
- Do not breathe in mold or mold spores.
- Consult **Appendices B, C, and D** for Remediation, Personal Protective Equipment (PPE) to be used during remediation and Containment guidance.
- Consider using PPE when disturbing mold during investigation. Depending upon the situation, a half-face NIOSH-approved N-95 respirator, gloves, and goggles are recommended.

Communicate with building occupants at all stages of process, as appropriate1.

When mold growth requiring Level III or IV (large-scale) remediation is found (See Appendix B), the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

Routine Investigation and Evaluation of moisture and mold problems3.

- Determine the total surface area of visible mold affected (square feet).
- Consider the possibility of hidden mold.
- Clean up small mold problems and fix moisture problems before they become large problems.
- Select remediation personnel or team based on the assessment.
- Investigate areas associated with occupant complaints.
- Identify source(s) or cause of water or moisture problem(s).
- Note type of water-damaged materials (wallboard, carpet, etc.).
- Check inside air ducts and air handling unit,

Assessments Requiring Sampling

Air sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician/medical practitioner desires to confirm the causative agent.

Pre- and post-remediation air sampling may be necessary if there is evidence from a visual inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination².

When air sampling is deemed necessary and is performed, outdoor air samples should be collected at the same time at the fresh air intake, which serves the suspected area. Values obtained should be compared and the indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air. If they are different, bioamplification is occurring and the problem needs corrected.

Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', "Bioaerosols: Assessment and Control⁴."

Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program. For further mold assistance, contact USACHPPM, Industrial Hygiene Field Services Program, DSN 584-3118 or (410) 436-3118.

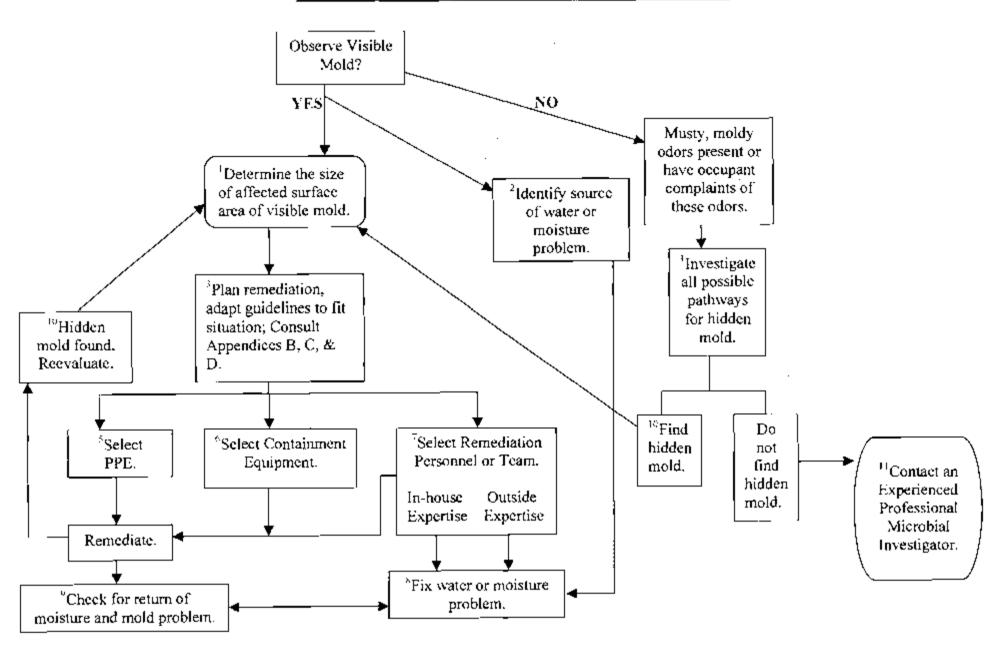
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- 3. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. Should You Have the Air Ducts In Your Home Cleaned? EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (HCRC). HCRC S500, Standard and Reference Guide for Professional Water Damage Restoration, 2nd edition, 1999.
- 7. Occupational Safety & Health Administration. Respiratory Protection Standard, 29 Code of Federal Regulations 1910.134, 63 FR 1152. January 8, 1998,
- 8. American Industrial Hygiene Association, Report of Microbial Growth Task Force, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

MOLD INVESTIGATION DECISION LOGIC

MOLD INVESTIGATION DECISION LOGIC



MOLD INVESTIGATION DECISION LOGIC NOTES:

- 1. Roughly approximate the total surface area of visible mold. Categorization of the remediation levels are sometimes borderline, so when trying to decide the category to apply, consider the extent of visible growth, such as a heavy blanket of growth on the surface, to barely visible. If heavy growth is apparent, consider moving up to the next level of protection.
- 2. Do not skip this step. Address the source of water or moisture problem or the mold will simply reappear.
- 3. Always protect the health and safety of the building occupants and remediators.
- 4. Mold may be hiding on the backside of drywall, vinyl wallpaper, or paneling, the top of ceiling tiles, the underside of carpets and pads. Check walls behind furniture, pipe chases and utility tunnels, porous thermal or acoustic liners inside ductwork, or check the rafters (due to roof leaks or insufficient insulation)³.
- 5. Utilize appendices B and C for remediation guidance. Use your best judgment during investigations, if not disturbing the mold you may need minimal to no PPE. Do not alarm building occupants unnecessarily, but protect yourself as necessary.
- 6. If the containment is working properly, the polyethylene sheeting will billow inwards on all surfaces. If it flutters or billows outward, containment has not been achieved, and you should find and correct the problem before starting your remediation activities. Confirm negative pressure with smoke tubes.
- 7. Select remediation personnel who have the experience and training needed to implement the remediation plan.
- 8. You must completely fix or eliminate the water or moisture problem to solve the problem.
- 9. You should revisit the site(s) approximately two weeks after remediation, and it should show no signs of water damage or mold growth,
- 10. If you discover hidden mold, revise your plan by reassessing the size of moldy area.
- 11. If you believe that you have a hidden mold problem, you may want to consider hiring an experienced mold investigative professional.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Material or Formshing Affected	Clearup Methods†	Personal Protective Equipment	Containedest			
	SMALL - Total	Surface Area Affected Less Than 10 square	e feet (ft ³)			
Books and papers			•			
Curpet and backing	1,3	.				
Concrete or cinder block	1,3	4				
Hard surface, porous flooring (broleum, ocransic tile, vinyl)	1, 2. 3	Minimum				
Non-porous, bard surfaces (plastics, metals)	1,2,3	N-95 resparator, gloves, and goggles	None required			
Jpholstered furniture & drapes	1,3	_				
Wallboard (drywall and gypsum board)	3					
Wood stufaces	1, 2, 3					
	MEDIUM - T	otal Surface Area Affected Between 10 and	100 ft ²			
Books and papers	3	_				
Carpet and backing	1,3,4	4				
Concrete or cinder block	1,3	Limited or Full	Limited			
Hard surface, porous flooring (linoleum, ceramic isle, vinyl)	1,2,3	Use professional judgment, consider	Use professional judgment, consider			
Non-porous, hard surfaces (plastics, metals)	1,2,3	potential for remediator exposure and size of consuminated area	potential for remediator/occupant exposure and size of contaminated are			
Opholstered familiare & drapos	1,3,4					
Watthoard (drywall and gypsum beard)	3,4	<u>_</u>				
Wood surfaces	1,2,3					
		face Area Affected Greater Than 100 R ² or idiator Exposure During Remediation Esti				
Books and papers	3					
Carpet and backing	1,3,4					
Concrete or einder block	1,3	Full	Fult			
Hard surface, popous flooring (Intofeum, ceramic tile, vinyl)	12,3,4	Use professional judgment, consider potential for remediator/occupant exposure	Use professional judgment, consider potential for remediator exposure and so			
Non-paruus, hard surfaces (plastics, metals)	1,2,3	and size of contaminated area	of contaminated area			
.'pholytered furniture & drapes	1.2.4]				
Waliboard (dry walk and gypsum board)	3,4					
Wood surfaces	1.2,3.4	1				

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will
 remain in the material but will not grow if the material is completely dried). Steam cleaning
 may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside
 of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and
 covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block
 supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber.
 Maintain area under negative pressure with HEPA filtered fan exhausted outside of building.
 Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator
 (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in
 the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA
 filters do not remove vapors or gases. You should always use respirators approved by the
 National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

®TYVEK, DuPont de Nemours, E.I., & Co., Wilmington, DE.

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to

minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely scaled and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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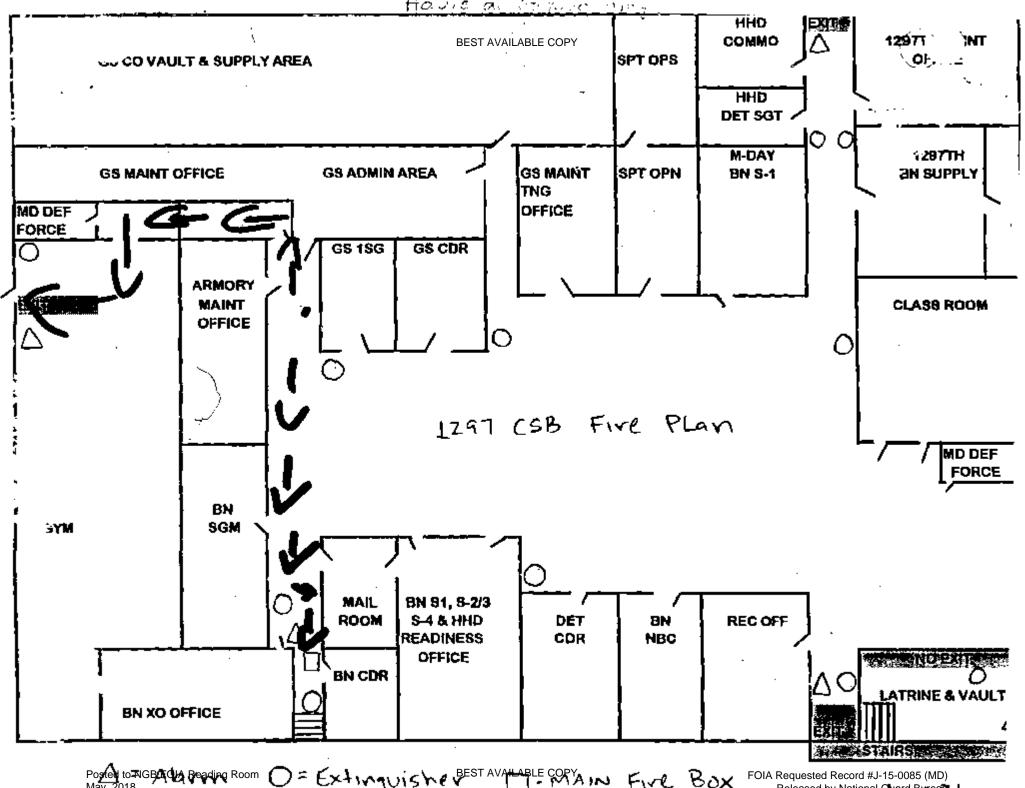


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MDARNG Facilities III Baseline Surveys, Havre de Grace Armory, Havre de Grace, MD, Project No. 55-ML-01ED-03/05

APPENDIX G

SITE MAPS



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FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bures Page 3762 of 5269



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Industrial Hygiene Survey

National Guard Facility Havre de Grace Armory (Fred M. Coleman) 301 Old Bay Lane Havre de Grace, MD 21078

Prepared For:

National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location:

Havre de Grace Armory

(Fred M. Coleman Armory)

301 Old Bay Lane

Havre de Grace, MD 21078

Prepared By:

Analytical Laboratory Services, Inc.

3544 North Progress Avenue

Suite 100

Harrisburg, PA 17110

Survey Date:

August 19, 2010

Report Date:

September 21, 2010

ALSI Project #:

1008543

Non-Responsive

Director, Environmental Health & Safety

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Section 1.0 Executive Summary

Section 1.0 Executive Summary

An industrial hygiene survey was conducted on August 19, 2010, at the Havre de Grace Armory located at 301 Old Bay Lane, Havre de Grace, MD 21078. The survey was performed by Ms. Non-Responsive This is also known as the Fred M. Coleman Armory.

- 1. Lead surface, air and bulk samples were collected. Surface levels of lead exceeded 200 ug/ft² in Room 124 on top of the heater. Housekeeping and cleaning should be improved to maintain lead levels below 200 ug/ft². The bulk sample of peeling paint collected from the drill hall was determined to be 3.8% lead by laboratory analysis. This is a significant amount of lead and may present a potential health hazard most notably in areas where paint in peeling and damaged. Peeling and damaged paint should be repaired and properly remediated.
- 2. Lighting levels met the minimum recommended guidelines in all but the following areas: 1) Room 124/126, 2) Room 105, 3) Room 206. Lighting should be improved in these areas.
- 3. Indoor air quality parameters of temperature, relative humidity carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment. Relative humidity exceeded the recommended ceiling of 60% and temperature was less than the recommended criteria of 73 degrees F in a few locations. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.
- 4. The steam pipe under the wooden floor is not properly insulated which causes steam to come through the floor. This provides a source of moisture which can provide an environment suitable for microbial growth and proliferation as well as a safety hazard. We recommend that the steam pipes be inspected by a qualified professional and appropriate action be taken to eliminate the source of moisture. If fungal growth is present it should be properly remediated. The safety hazard is present due to the deterioration of the wooden flooring. In Room 100 & 117 the floors are broken through (see photo). Damaged areas of flooring should be repaired in conjunction with the steam line insulation repair and potential fungal growth remediation.
- Water damaged ceilings and active roof leaks are present. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced.

Section 2.0 Operation Description & Observations

Section 2.0 Operation Description & Observations

The Havre de Grace Armory is mainly an administrative facility with many offices, training and storage areas. There were approximately 30 full-time employees stationed at this facility at the time of this survey.

The building was initially constructed in the early 1900's. It was originally the clubhouse at a horse track. There have been several renovations throughout the years. The exterior is wood siding. The interior walls are primarily block, plaster, or drywall. The floors are wood with some vinyl floor tile.

The heating, ventilating, and air conditioning system (HVAC) consisted of central air-conditioning in newer areas of the building supplemented by window air-conditioners in older areas of the building. There are three air handlers. Outdoor air ventilation occurs via the HVAC system in areas where the system is present. Some doors and windows were open on the day of this survey. A limited inspection of the HVAC system was performed. The units could not be opened for inspection. Filters were removed and inspected. There was some accumulation of dirt present on filters as would be expected. Portions of the units that could be observed were clean and appeared in good condition.

There is an old firing range in the building. It was closed in the 1970's and has been fully abated. It is now an office area. There is no child-care facility in the building.

Overall housekeeping was good. Areas were clean and well kept.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. Personnel had supportive chairs.

Section 3.0 Noise Survey

Section 3.0 Noise Survey

Employees were not performing tasks that provided excessive noise levels. Therefore, noise exposure monitoring was not conducted.

Section 4.0 Lead Testing

Section 4.0 Lead Testing

At the time of the assessment, no activities were observed which would generate lead exposure. The facility contains an office area which was once an indoor firing range.

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample#	Location	Air ug/m³	Surface ug/ft²	Paint Chip %Pb
	Room 100	<4.2		!
2	Drill Hall	<4.3	Ī	
3	Blank	<3 (ug)		· · · · · · · · · · · · · · · · · · ·
4	Converted Firing Range – Room 114 Floor		<110	
5	Converted Firing Range – Room 115 Desktop		<110	!
6	Converted Firing Range Room 116 AV Vent		<110	<u> </u>
7	Floor Outside Converted Firing		<110	
8	Room 122 - Top of Filing Cabinet		<110	
9	Room 124 Top of Heater		220	· - · - · - · - · - · - · - · - · · - ·
10	Main Lobby - Floor		<110	
11	Room 111 – Desktop		< 10	
12			<110	
13	Hallway Floor Outside Room 105		<110	
14	Kitchen Top of Food Storage Shelf		< 110	
15	Drill Hall - Floor		<110	
16	Drill Hall - Fireplace Mantle		<110	
17	Drill Hall Diving Area For of		<110	-
18	Room 206 Tabletop		<110	
19	Blank		<12 (ug)	
20	Drill Hall Wall			3.8
riteria		50	200	0.5

Key: Bolded results exceed listed criteria

Lead surface, air and bulk samples were collected. Surface levels of lead exceeded 200 ug/ft² in Room 124 on top of heater.

The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. In the "Derivation of Wipe Surface Screening Levels for Environmental Chemicals," the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³. In fact, no detectable level of lead was identified in the air samples collected.

Deteriorated paint was observed in a many locations throughout the facility. Delaminated paint was mostly due to age along with prolonged exposure to elevated relative humidity levels. A paint chip sample was collected from peeling paint in the Drill Hall. This paint was found to be 3.8% lead. This is above the HUD definition of lead-based paint (0.5%).

Housekeeping and cleaning should be improved to maintain lead levels below 200 ug/ft². The bulk sample of peeling paint collected from the drill hall was determined to be 3.8% lead by laboratory analysis. This is a significant amount of lead and may present a potential health hazard most notably in areas where paint in peeling and damaged. Peeling and damaged paint should be repaired and properly remediated.

section 5.0 Lighting

Section 5.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400I. Precision Light Meter (Serial No. K070003). The light meter was last calibrated on November 26, 2009. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended Lighting	Sufficient Lighting
Room 123	46.3	30-50	Yes
Room 124/126	26.0	30-50	No
Room [22B	40.1	30-50	Yes
Room 113	48.3	30-50	Yes
Room 112	41.5	30-50	Yes
Room 117	87.0	30-50	Yes
Room 107	59.6	30-50	Yes
Room 105	17.0	30-50	No
Room 206	25,0	30-50	No
Room 204	35.0	30-50	Yes
Drill/Mess Hall	43.0	30-50	Yes
Dining Area	18.0	10	Yes

Lighting levels met the minimum recommended guidelines in all but the following areas: 1) Room 124/126, 2) Room 105, 3) Room 206. Lighting should be improved in these areas.

Section 6.0 Indoor Air Quality

Section 6.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7565X (Serial # 0839020). The IAQ Meter was last calibrated in March 2010.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior of the structure ranged from 69.2 to 76.2 degrees F with relative humidity readings ranging from 54.7% to 73.5%. During the survey, carbon dioxide (CO₂) levels ranged from 432 ppm to 564 ppm within the facility compared to an outdoor CO₂ level of 332 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO₂ recommended is 1,032 ppm (332 ppm + 700 ppm). Carbon monoxide (CO) ranged from 0.0 – 0.1 ppm.

The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Outdoors	77,2	72.0	341	0.0
Room 123	76,2	56.0	462	0.0
Room 124/126	75.5	58.0	451	0.1
Room 122B	75.3	55.9	474	0.1
Room 113	75.2	55.5	459	0.0
Room 112	69.2	55.1	478	0.1
Room 117	71.5	62.3	464	0.0
Room 107	71.7	73.5	564	0.0
Room 105	70.0	54.7	446	0.0
Room 206	70.6	59.2	431	0.0
Room 204	71.7	70.0	508	0.0
Drill/Mess Hall	73.1	59.7	448	0.0
Dining Area	74.0	58.2	432	0.0
Outdoors	78.7	63.9	323	0.0
Criteria	73.0-79.0	30-60	<1,032	<9.0

Key: Bolded results exceed listed criteria

Relative humidity exceeded the recommended ceiling of 60% and temperature was less than the recommended criteria of 73 degrees F in some locations. There is central air conditioning system in newer areas of the building and window air-conditioners in other areas. Outdoor conditions were hot and humid. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.

Carbon dioxide levels did not exceed the recommended ceiling of 1,032 ppm. This suggests that outdoor air ventilation is adequate in this area. There is a mechanical ventilation system for some areas of this facility which provides outdoor air ventilation.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- 1. There is a musty odor throughout the building.
- 2. There is a steam pipe under the wooden floor. It is not properly insulated which causes steam to come through the floor. This provides a source of moisture which can provide an environment suitable for microbial growth and proliferation as well as a safety hazard. We recommend that the steam pipes be inspected by a qualified professional and appropriate action be taken to eliminate the source of moisture. If fungal growth is present it should be properly remediated. The safety hazard is present due to the deterioration of the wooden flooring. In Room 100 & 117 the floors are broken through (see photo). Damaged areas of flooring should be repaired in conjunction with the steam line insulation repair and potential fungal growth remediation.
- 3. Water damaged ceilings and active roof leaks are present. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced.

Section 7.0 Suspect Asbestos Containing Building Materials

Section 7.0 Suspect Asbestos Containing Building Materials

Suspect asbestos containing materials (ACM) include sheetrock/joint compound, plaster wall and ceiling systems, floor tiles and associated mastic, and vinyl cove base. Thermal system insulation which is most likely a combination of paper wrapped fiberglass with PVC clbows and well as pre-formed TSI with modded clbows was suspected. No samples were collected. Inaccessible areas were not inspected.

The following are the most notable findings regarding suspect ACM at the time of this survey:

- 1. Ceiling tile in kitchen are suspect ACM. All are in good condition.
- 2. 12" x 12" vinyl floor tile and mastic was observed in the facility. This was in good condition except for a few areas with water damage.

Section 8.0 Maintenance Bay

Section 8.0 Maintenance Bay

There is no garage area at this facility.

Section 9.0 Limitations

Section 9.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Analytical Laboratory Services, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A Laboratory Analysis Report



and analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

						Non-F	Affentions
9/1/2016	8/31/2010 Report Date:	8/31/2010	Date Analyzed:	W912K6-09-A-0003	P.O. Number:		
	Non-Re		Person Submitting:	Fred M. Coleman Amony	Job Numbers	Havre de Grace, Maryland 21078	
10020	ĺ	8724/2010	Date Suhmitted:	Havre de Grace, MD.	Job Location:	301-IH Old Bay Lane, Athu NGB-AVN-SI, State Millray Reservation	Address:
NY FIL	1	508631	Chrain Of Castody:	Fred M. Celenian Armory	Job Name:	National Guard Bureau	Clent
LAB.rico470							

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Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Cfiert Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ff)	Rep	Reporting Limit	Total ug	Idnal Result	=	Communis
1073234	1008543-1	Fame	Air	715	N/A	42	ug/m/	7	42	ug/ns³	The state of the s
1073235	1008543-2	Flame	Air	700	NIA	£	tig/m³	₹	44.3	ASI/SIN	
1073236	1008543-3	Flame	Air Biank	8	N/A	المناؤ	ng/m,		Ÿ	홟	
1073237	1008543-20	Fleane	Paint Chip	機会を養い	NA	0.0082	04%		30 60	%Pb	
1073238	1,008543-4	Flame	Wipe	香香香香	0.108	110	:Ugu	<12	<110	ug/II*	
1073239	1008543-5	Flame	Wipe	***	0.108	110	ug/R ²	4	011∨	ug/M²	
1673240	1008543-6	Flame	Wipe	安 州安省	0.108	01-1	ng/B?	77	<110	ng/it-	
1073241	1008543-7	Flans	Wipe	各条条件	.0,103	011	ng/ft²	ZI>	011 5	115/Elt	
1073242	1008543-8	Flame	Wipe	***	0.108	110	ng/R2	<12	0115×	ug/H²	
1073243	1008543-9	Flame	Wipe	***	0,108	110	ng/ft².	24	220	ug/ff*	
1073244	1008543-10	Flame	Wipe	~~~	0.108	911	ug/fi²	42	<110	ug/III-	
1073245	1008543-11	Flame	Wipe	***	0.108	1-16	ng/fir	< <u>12</u>	0115	ug/ff ²	
1073246	1008543-12	Flame	Wipe	***	0.108	911	ug/ft²	<12	01 IV	ug/III-	
1073247	1608543-13	Flame	Wipe	**	0.108	110	ng/fgz	2 2	<110	ng/H²	
1073248	1008543-14	Flame	Wipe	**************************************	0.168	011	ug/ft²	ZI>:	01 IV	ug∕M²	
1073249	1008543-15	Flame	Wipe	顺器水金	0.108	110	ug/R2	<12	OT 150	ug/ff²	
1073250	1008543-16	Flame	Wipe	申 使得关	0.108	110	'II'S	<12	0 ∨	ug/Us	
1073251	1008543-17	Flame	Wipe	安集事件	0.108	110	HA/H	€13	4116	ng/fl²	
1073252	1008543-18	T anne	Wipe	李泰泰	0.108	110	112/113	<12	€110	ug/fil-	

submitted and accepted for the exclusive use of the circuit to whom it is addressed and upon the condition that it is not to be used, in whole of in part, in any advertising or publicly matter without provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly discinnate any fewerfulen provided by the persons submitting them and, unless collected by the citical. NVLAP accreditation applies only to polarized light interescept of built samples and this singular will be discarded in accordance with the appropriate regulatory gendelines, unless requested by the citical. NVLAP accreditation applies only to polarized light interescept of built samples and tensmission electron microscopy of AFERA air samples. This report must not be used to claim, and does not imply product certification, presented by NV ELAP, AHIA, NVLAP, NST, or my agency of the Federal Government. All As a matual protection to clients, the public, and these Laboratories, this report is This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently then tend or similar produces. rights reserved. AMA Analytical Services, Inc.

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and ancivical Services, Inc.



A Specialized Environmental Lahoratory

CERTIFICATE OF ANALYSIS



8/24/2010 508631

Date Submitted:

Chain Of Custody:

fred M. Coleman Armory

Have de Grace, MD

Job Lacation:

301-14 Old Bay Lane, Alln. NOS-AVN-SI,

National Guard Bureau

State Military Reservation

Havre de Grace, Maryland 21078

Attention:

lob Name:

Fred M. Coleman Armery

W912K6-09-A-0003

P.O. Number: Job Number:

9/1/2010

Report Date:

8/31/2010

Person Submitting: Date Analyzed: Page 2 of 2

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Summary of Atomic Absorption Analysis for Lead

	Сапи	A STATE OF THE STA
A. A	Final Result	William available of the control of
00-00-00-00-00-00-00-00-00-00-00-00-00-	In letel	
	Reporting Limit	The state of the s
	Arca Wiped (nº)	ELECTRONIC CO.
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A	Sample T	
The second secon	le Analysis Type	manufacture in Country of the Countr
The same of the sa	Client Sample Number	The state of the County of the State of the
	ANA Sample Number	

See QC Summary for analytical results of quality control samples associated with these sampes. NY ELAP acceditation applies only to paint chip, wipe, and soil Analysis Method For Furnase: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/2001/0-7421; Water, SA-3113B

2

Analysis Method for Flame: Air, Wipes, Paints, and Soit/Soilds: EPA 600/R-93/200(M)-7420; Water: SM-3111B

WhoBlank

mg/Kg = parts per million (ppm) on a dry weight basis

ug = micrograms.

Note: All samples were received in good condition unless otherwise noted.

%Pb = percent lead on a dry weight basis

NA - Not Applicable

1073253

Note: All results have two significant digits. Any additional digits shown

should not be considered when interpreting the result.

Air and Wilpe results are not corrected for any blank results

Final results for air and wipe samples are based on client

supplied information not verified by this laboratory.

change unless signed by the Technical Director or Deputy. All results are to be considered preliminary and subject to

samples. mg/L = parts per million (ppm)

ug/L = parts per billion (ppb)

G Edward Camey Fechnical Manager:

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desertions, and collection professions may be information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly discuss and inbility for the accuracy and completeness of

nichalisted and accorded for the exclusive use of the client for whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity master willout prior written authorization from us. Sample types

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Appendix B Photographs



Photo I: Exterior views

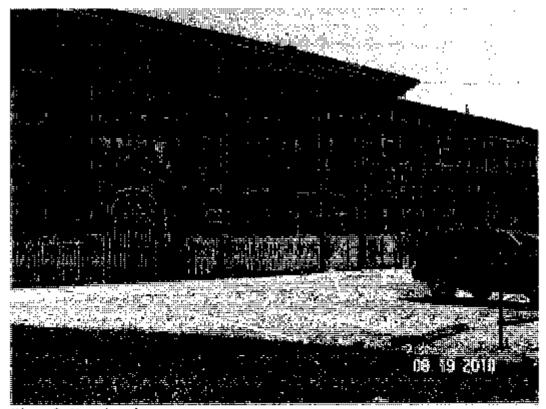


Photo 2: Exterior view



Photo 3: First Coor, Ren. 100; broken flooring



Phote 4: First floor, Art. 100, broken flooring

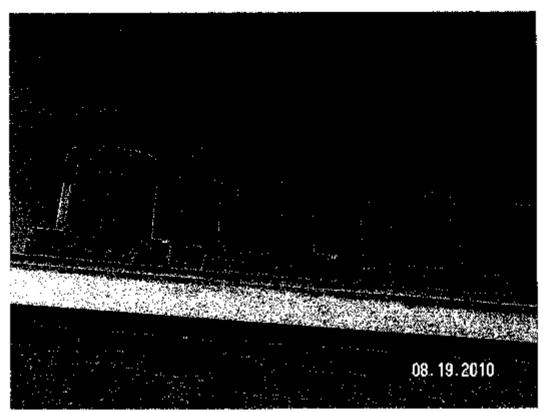


Photo 5; AC condensers, outside

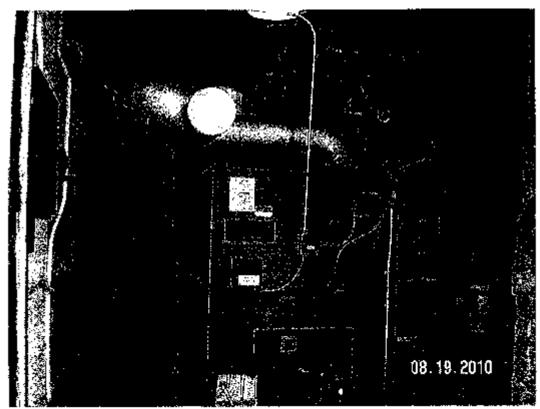


Photo 6: Boiler

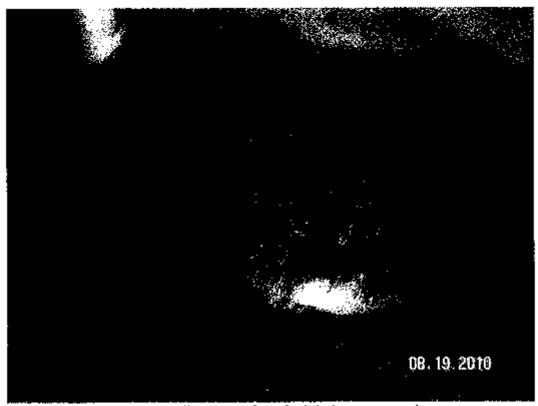
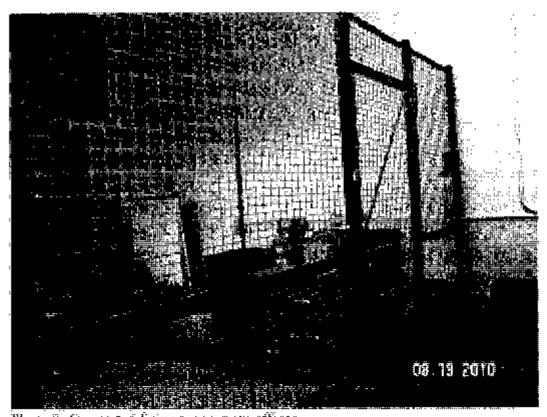


Photo 7: Crawl space; standing water from leak in hot water tank



Picola &: Converted fring range, now affices



Photo 9: Converted firing range, now offices



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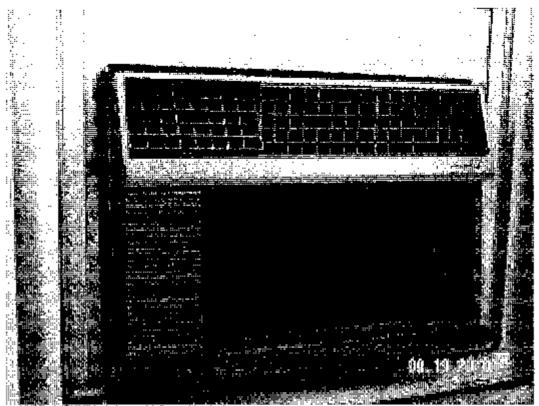


Photo II: Boem 107: window AC, missing theat (edec and high humidity in resm)



Photo 12: Drill Hall

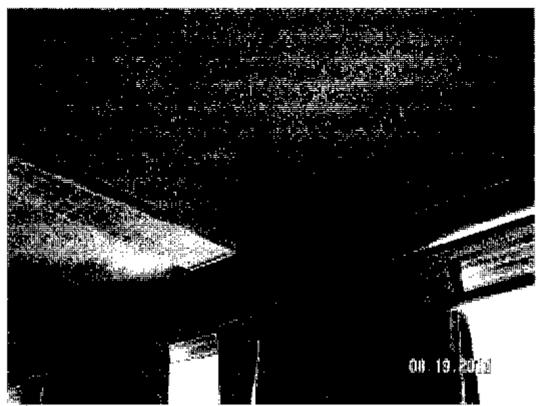
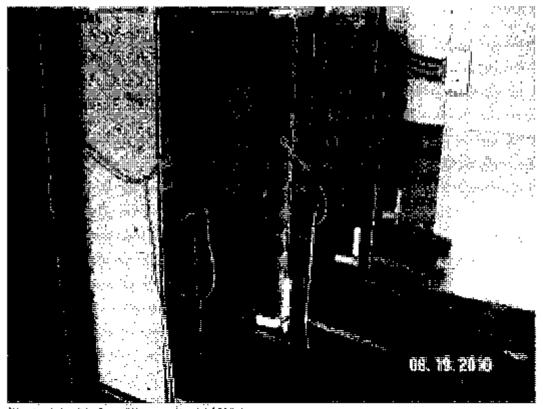


Photo 13: Chill Hall ceiling, chipping/pecling paint, water damage



Prophy 1st; Air handling, units (AHICs).

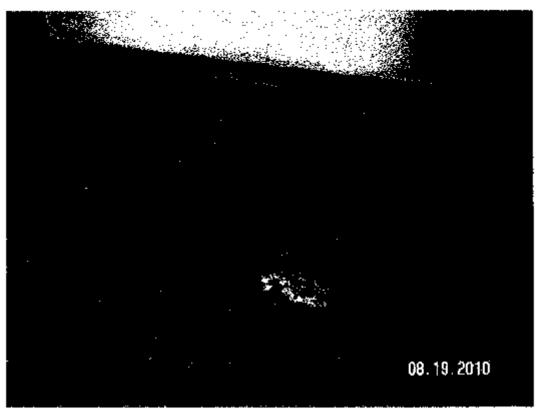
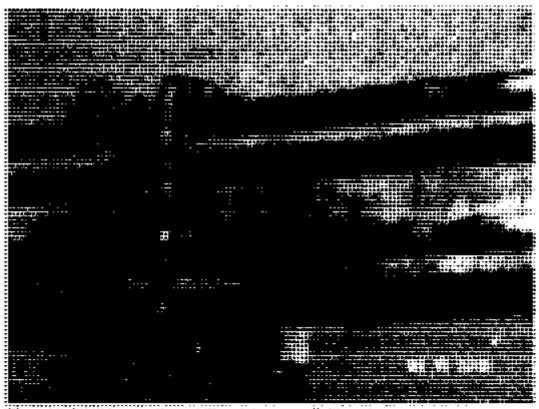
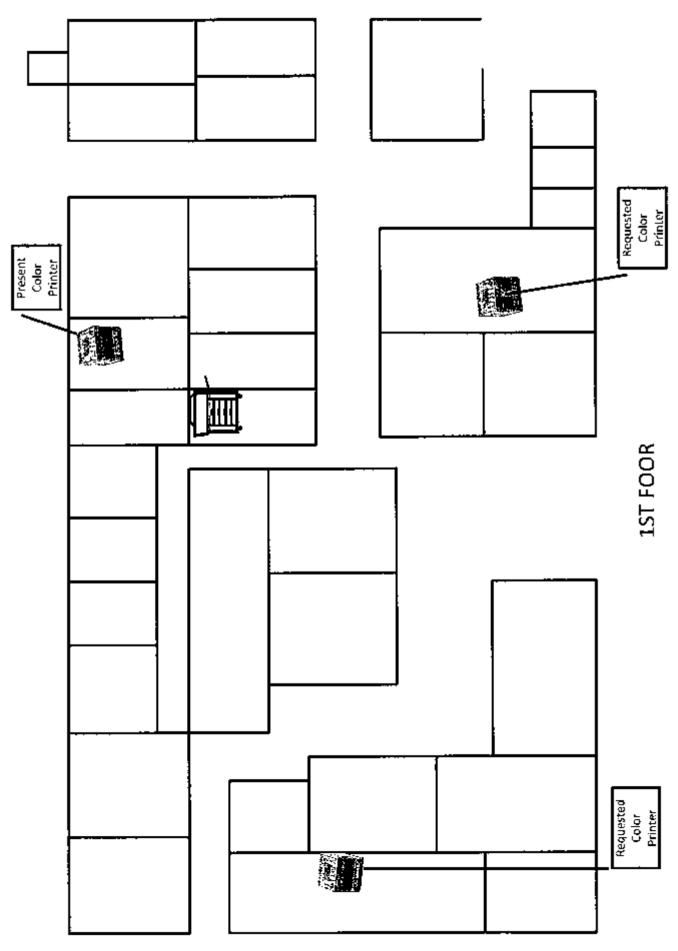


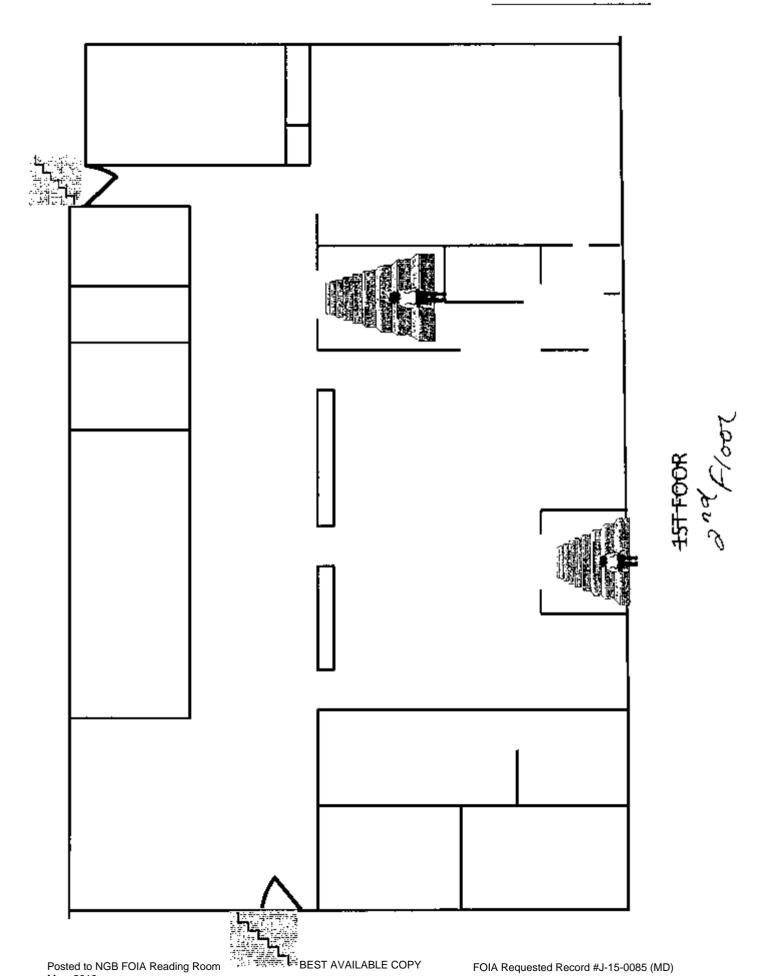
Photo 15: AHUs leaked; damaged and warped vinyl flooring tiles



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Appendix C Floor Plan





Posted to NGB FOIA Reading Room May, 2018

Appendix D References

Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead
- 2. American Conference of Governmental Industrial Hygienists (ACGIII) Threshold Limit Values and Biological Exposure Indices, 2010 Edition
- Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition
- 4. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ventilation for Acceptable Indoor Air Quality, 62.1-2007
- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227(h)(3)]
- 9. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)
- 10. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation



1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 717.590.7031 Fax: 717.590.7936 www.complianceplace.com

Industrial Hygiene Survey Report

National Guard Facility Havre de Grace Readiness Center

Prepared For: National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location: Havre de Grace Readiness Center

301 Old Bay Lane

Havre de Grace, MD 21078

Prepared By: Compliance Management International, Inc.

1215 Manor Drive

Suite 205

Mechanicsburg, PA 17055

Survey Date: May 29, 2013

Report Date: June 24, 2013



Manager, Industrial Hygiene Services

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on May 29, 2013, at the Havre de Grace Readiness Center located at 301 Old Bay Lane, Havre de Grace, MD 21078. The survey was performed by Mr. Non-Responsive.

- 1. Lead surface, bulk, and air samples were collected. Surface levels of lead exceeded 200 micrograms per square foot (ug/ft²) in two locations. See Section 3.0 for detailed findings.
- 2. Lighting levels did not meet the American National Standards Institute/Illuminating Engineering Society of North America (ANSI/IESNA) recommended guideline in three locations. See Section 4.0 for detailed findings.
- 3. Indoor air quality (IAQ) parameters of temperature, relative humidity, carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment.
 - a. Temperature levels met the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 55-2010 recommended guideline of 68-79 °F in two areas sampled.
 - b. The relative humidity levels were above the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) TG 277 recommended guideline of 30-60% in all indoor areas sampled.
 - c. Carbon monoxide (CO) levels were less than the National Ambient Air Quality Standard (NAAQS) recommended ceiling of 9 parts per million (ppm).
 - d. Carbon dioxide (CO₂) levels met the ASHRAE 62.1-2010 recommended guidelines for mechanically ventilated office buildings and commercial settings.

See Section 5.0 for detailed sampling results.

- 4. Water-stained ceiling tiles were observed in the facility. See Section 5.0 for detailed findings.
- 5. Isolated areas of suspected asbestos containing materials (ACM) were damaged. See Section 6.0 for detailed findings.

Section 2.0 Operation Description & Observations

The Havre de Grace Readiness Center is mainly an administrative facility with a drill hall, offices, classrooms, conference room and a converted firing range area (currently offices). There were approximately 16 full-time employees stationed at this facility at the time of this survey.

The building was reported to have been built in 1924 and was converted from a grandstand of a race track. It is a two-story structure with a basement. The exterior is constructed of wood and shingles. The interior walls are plaster, paneling, wood, and drywall in some of the offices. The floors are concrete, wood and floor tile.

The heating system consists of a gas-fired hot water generating unit. There is no central air conditioning. Some window air conditioners are present.

There is no child-care facility in the building.

It was reported that the basement area was infested with rats. The area has been treated. There is a residual on the floor. It was recommended that CMI not enter the area.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared to be properly designed. Personnel had supportive chairs.

This facility has a converted firing range that is now used as office space.

Peeling paint was observed on the exterior of the build. Both asbestos and suspect lead-based paint was observed along the exterior drip line of the building.

Housekeeping practices were adequate.

Section 3.0 Lead Testing

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the American Society for Testing and Materials (ASTM) E 1792 protocols. Air samples were collected using 0.8 micrometer (um) mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using Environmental Protection Agency (EPA) Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Air ug/m ³	Bulk (%)	Surface ug/ft ²
1	Drill Hall	<6.4	*	*
2	Converted Range Hallway	< 6.4	*	*
3	Drill Hall – Floor	*	*	<110
4	Drill Hall – Top of Piano	*	*	470
5	Drill Hall – Top of Fire Place Mantel	*	*	<110
6	Dining Room – Top Radiator	*	*	350
7	Dining Room – Top of Bar	*	*	<110
8	Wall Locker Storage Area – Top of Wall Locker	*	*	<110
9	Converted Firing Range Hallway – Floor	*	*	<110
10	Converted Firing Range Hallway – Ladder	*		<110
11	BN SGM Office – Top of TV	*	*	<110
12	GS Maintenance Office – Top of Book Shelf	*	*	<110
13	Motor Pool Office – Top of Table	*	*	<110
14	Main Office Area – Top of Desk	*	*	<110
15	Blank Wipe	*	*	<12 ug
16	Blank Air	<3 ug	*	*
17	Exterior Paint Chip Composite	*	0.23	*
_	Criteria	50	0.5	200

Table Notes:

- 1. Bolded results exceed listed criteria
- 2. ppm = parts per million
- 3. $ug/ft^2 = micrograms per square foot$
- 4. $\mathbf{ug/m}^3 = \text{micrograms per cubic meter}$
- 5. **ug** = micrograms

Sources:

- NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges
- 2. OSHA 29CFR1910.1025 Lead Standard

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The National Guard Bureau currently utilizes 200 micrograms per square foot (ug/ft²) as a benchmark for identifying lead-contaminated surfaces. This guideline is referenced in NG PAM 420-15 "Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges" as a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Lead surface, bulk and air samples were collected. The following is a summary of the sample results from this survey.

- Surface levels of lead exceeded the recommended guideline of 200 ug/ft² in the following locations:
 - o Drill Hall Top of Piano
 - o Dining Room Top of Radiator
- Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 micrograms per cubic meter (ug/m³).
- One composite paint chip sample was collected from the exterior front screened in porch entrance and the painted exterior wood on the side of the building. The lab result from this sample was 0.23% Pb which is less than the regulatory limit of 0.5%. However, all areas of peeling paint should be repaired.

Section 4.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400 Precision Light Meter (Serial No. 98011EL). The light meter was last calibrated in November 2012. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles (FC)	Recommended Lighting (FC)	Sufficient Lighting
Drill Hall	31.0	10	Yes
Dining Hall	27.7	10	Yes
Wall Locker Storage Area	22.1	10	Yes
Conference Room	49.7	30	Yes
BN XO Office	87.6	30-50	Yes
BN Sgt Maj Office	26.4	30-50	No
BN CO Office	25.4	30-50	No
GS Admin Office	25.6	30-50	No
GS Maintenance Office	54.3	30-50	Yes
Copy Room	77.1	10	Yes
Main Office Area	30.1	30-50	Yes
Motor Pool Office	52.1	30-50	Yes
Recruiting Lobby	32.8	10	Yes

Table Notes:

- 1. FC = Foot Candles
- 2. **Bolded** results did not meet listed criteria

Source: ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

The lighting level did not meet the minimum recommended guideline in the BN Sgt Major Office, BN CO Office and the GS Admin Office. Lighting should be improved in these areas.

Section 5.0 Indoor Air Quality

Survey measurements were made for comfort parameters and ventilation (temperature, relative humidity, carbon dioxide, and carbon monoxide). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7575-X (Serial #1228008). The IAQ Meter was last calibrated in July 2012.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2010). ASHRAE specifies temperature ranges for human comfort (ASHRAE 55-2010). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60%.

The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Drill Hall	73.1	69.7	667	0.0
Dining Hall	73.5	67.4	690	0.0
Conference Room	74.8	65.8	672	0.0
BN XO Office	73.8	65.8	762	0.0
Main Office Area	74.2	67.8	622	0.0
Motor Pool Office	75.0	65.1	813	0.0
Outdoors	89.1	44.6	320	0.0
Criteria	68-79	30-60	<1,020	<9

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. (%) = percent relative humidity
- 4. ${}^{\circ}\mathbf{F} = \text{degrees Fahrenheit}$

Sources: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) 55-2010, 62.1-2010, Environmental Protection Agency (EPA) National Ambient Air Quality Standard (NAAQS) & The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation.

Summary of findings and recommendations:

- Temperature measurements were within the recommended guideline of 68-79°F in all sampled areas.
- Relative humidity levels were above the recommended guideline of 30-60% in all sampled areas. High relative humidity can provide an environment suitable for microbial growth and proliferation.
- Carbon dioxide levels were measured to evaluate building ventilation or the introduction of outdoor air into the building. The recommended ceiling is obtained by adding 700 ppm to the measured outdoor carbon dioxide level for this survey. Carbon dioxide levels did not exceed the recommended ceiling of 1,020 ppm. This is an indication that outdoor air ventilation is adequate.
- Carbon monoxide levels measured were less than the recommended ceiling of 9 ppm. The recommended ceiling of 9 ppm referenced in the above table is the National Ambient Air Quality Standard for carbon monoxide
- A visual inspection was conducted throughout accessible portions of the facility to assess sources or pathways of factors potentially deleterious to IAQ. The following observations were noted:
 - o Water-stained ceiling tiles were observed in the facility.
 - o Window air conditioning units running and doors to the exterior left open.

Section 6.0 Suspect Asbestos Containing Building Materials

The following suspect ACM was noted at the time of this survey:

- 1. The facility has 12"X12" floor tiles and black mastic in most rooms. In the kitchen and dining areas some sections of flooring were loose, damaged and in poor condition. < 10% of the total floor tile was damaged. Samples of these materials were collected and analyzed for asbestos content. Both the floor tile and floor tile mastic contained asbestos. The floor tile was 4% Chrysotile asbestos and the black floor tile mastic was 5% Chrysotile asbestos.
- 2. The exterior of the building is covered with asbestos containing shingles. Some isolated area of damage was observed. Less than 10% of the total shingles were damaged. A sample of the shingles was analyzed and found to contain 5% Chrysotile asbestos.

Damaged ACM should be properly repaired or abated.

Inaccessible areas such as behind walls or crawlspaces were not inspected. ACM could potentially be present in these areas.

Section 7.0 Equipment

The following equipment was utilized during this survey. All sampling equipment was properly calibrated prior to use and verified for accuracy as applicable. See daily reports and calibrations logs for detailed information.

Equipment	Serial #	Calibration Date	Value
TSI QTrak IAQ Meter	1228008	7/2012	NA
Cal Light 400 Light Meter	98011EL	11/2012	NA
SKC Air Sampling Pump	647598	5/29/13	2.5 LPM
SKC Air Sampling Pump	648349	5/29/13	2.5 LPM

Section 8.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Compliance Management International, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report

AMA Analytical Services, Inc.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAB #100476

Client:

National Guard Bureau

Job Name:

Havre de Grace RC

Chain Of Custody:

516026

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Hayre de Grace, MD

Date Submitted:

6/4/2013

State Military Reservation Havre de Grace, Maryland 21078

Job Number:

Not Provided

Person Submitting:

P.O. Number:

W912K6-09-A-0003

Date Analyzed;

6/11/2013

Report Date:

6/11/2013

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number			Area Wiped (fe)		orting Limit	Total ug	Final Res	Comments			
13067164	1	Flame	Air	468	N/A	6.4	ug/m³	<3	<6.4	ug/m³	
13067165	2	Flame	Air	468	N/A	6.4	ug/m³	<3	<6.4	ug/m³	
13067166	3	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067167	4	Flame	Wipe	****	0.108	110	ug/ft²	51	470	ug/ft²	
13067168	5	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13067169	6	Flame	Wipe	****	0.108	110	ug/ft²	38	350	ug/fl²	
13067170	7	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067171	8	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
13067172	9	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067173	10	Flame	Wipe	****	0.108	110	ug/fl²	<12	<110	ug/ft²	
13067174	11	Flame	Wipe	****	0.108	110	ug/ft²	<12 .	<110	ug/ft²	
13067175	12	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067176	13	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067177	14	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
13067178	15	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	
13067179	16	Flame	Air Blank	0	N/A	3	ug/m³		<3	ug	
13067180	17	Flame	Paint Chip	****	N/A	0.011	%Pb		0.23	%Pb	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval. or endorsement by NY ELAP, AlHA, or any agency of the Federal Government. All rights reserved, AMA Analytical Services, Inc.

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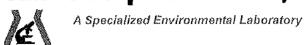
FOIA Requested Record #J-15-0085 (MD)

Posted to NGB FOIA Reading Room May, 2018

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AMA Analytical Services, Inc.

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CERTIFICATE OF ANALYSIS



LAS #100470

Client:

National Guard Bureau

Job Name:

Havre de Grace RC

Chain Of Custody:

516026

Address:

301-JH Old Bay Lane, Attn: ARNG-CJG-P, State Military Reservation

Job Location:

Havre de Grace, MD

Date Submitted:

6/4/2013

Job Number:

Not Provided

Person Submitting:

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Date Analyzed:

6/11/2013

Report Date: 6/11/2013

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample

Client Sample

Analysis Type Sample Type

Air Volume

Area Wiped

Reporting

Total ug

associated with these

samples.

Final Result

See QC Summary for analytical results of quality control samples.

Comments

Number

Number

(L)

(f(2)

Limit

Analysis Method for Flame; Air. Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7000B; Water, SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7010; Water: SM-3113B

N/A = Not Applicable mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm)

%Pb = percent lead on a dry weight basis

ug = micrograms

ug/L = parts per billion (ppb)

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Technical Manager:

G Edward Carney

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AIHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

516026

Page 3819 of 5269

(301) 459-2640 • (800) 346-0961 • Pax (301)	439-2043							+ 2				Pase lof
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4. Address 3: Havre de Grace, Maryland_2	1078	240.0054	4.	Contact			1001			William William	-Responsive	
5. Phone #: (410) 942-0273 F	ax #:(410) :	942-0254 ling Informatio								ugantest	_	
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☐ Fiberglass(OTY)		Residual A	ish	(OTY)	Q117			□РЬА	.ir	(QTY)		
THM Air - Please Indicate Filter Type:		TEM Dust								d(QTY)		• :
Q AHERA (QTY) Q NIOSH 7402 (QTY)		Qual. (pre	s/abs) Vacuum rea) Vacuum D	Dust		(QTY)		Drin	king W	ater Q Pb(QT)	Y) 🗆 Cu(QTY) 🗖 🗸	As(QTY)
Other (specify)(QT	Y)	Ouan. (s/a	rea) Vacuum D	0-99	· · ·	(QTY)		☐ Wast	e Water	□ Pb(QTY)	□ Cu(QTY) □ As	(QTY)
PLM Bulk ☐ BPA 600 – Visual Estimate(QTY)	:	TEM Water						Pb F		(Media)(QTY) ''
D RDA Point Count (OTY)		Qual. (pre	vabs) .2/BPA 100.2_	(QTY) _.	n	ERC			poaratus for Spore T	raps/Air Samples:	
O NY State Friable 198.1 (QTY) Grav. Reduction BLAP 198.6 (QTY)	,	□ EPA 100.1	2BPA 100.2_	(YTO)	~(611	, .		Colle	ection N	fédia	<u> </u>	· .
Other (specify)(QT) Y)		s received in g		n unles	s otherwise	noted.	☐ Spor	e-Trap		D Surface Vacuum Dust Culturable ID Genus (Media	
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☐ Vermiculite ☐ Asbestos Soil PLM(Quel) PLM(Quen) PLM/TEM(Quen)	al) PLM/TEM(Qu	ນະກ))(QTY)		
(SAMPHIER SPRINGSHOUS)			THE WORK	IS) o			TATRIX				CLIENT CONTACT	
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2 Converted Prairie	1 465			<i>i</i>	1				T .			
3 Den Hell - Floor		100 EM-		X		X						
Y DOWN HAM TOP OF ARM	 	1,3,3		7		X						
5 Dall Hall - 50- 012-			1	$\overline{\chi}$		X				Date/Time:	Contact:	By:
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PSILATION ON CAR: FOIA Reading Room May 2018 Y 4. Comments:	:/_	/	_ @BE	By ARVANIO	BLE	COPY	 .		 -	Sign:FOIA	Requested Record	#1-15-0085 (MD)
May 2018 V	KE AND	C / NTT		V	a:		Date:	/.		_/' Yim	Requested Record	ial Guard Bureau
4. Comments:	<u>わりに</u>	1,107 OK	<u></u>				:			·		age 3819 of 5269

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159202

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AMA Analytical Services, Inc.
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4475 Porbes Blvd. • Lanham, MD 20706
(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

516026 pan2ct

Mailing/Billing Information:		Sul	bmittal Informa	tion:	
Client Name: National Guard Bureau			Job Names	HENTE	de Gran Re
2. Address 1: 301-IH Old Bay Lane		2.	Tible critish		c Gm - mo
3. Address 2: Attn: NGB-ARS-JHNE	<u> </u>	. 3	Job #:	·	P.O. #: W912K6-09-A-0003
4 Address 3: Havre de Grace, Maryland 21	078	4.	Contact Person:	Non-Resi	DONSIVE @ platon-Responsive 42-0273
5. Phone #:(410) 942-0273 Pag	x #:(410) 942-0254	. 5.	Subhicacya		2000 E
	Reporting Infor	mation (Results wi	ill be provided a	s soon as technicall	y teasible):
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24 Hours Time Due:	Day	Day + Date Due:	Med	ryAttempt Will Be e to Accomodate)	
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PCM Air - Please Indicate Filter Type:	□ ELA	P 198.4/Chatfield	(QTY)		D Pb Paint Chip (QTY) D Pb Dust Wipe (wipe type Calcult) 3 (QTY)
NIOSH 7400 (QTY)	ŪΝΫ	State PLM/TEM	(QTY)		Pb Air 3 (QTY)
TEM Air - Please Indicate Filter Type:	TRM Dust	dual Ash			☐ Ph Soil/Solid · (OTY)
☐ AHERA(QTY). ☐ NIOSH 7402(QTY)	□ Oua	l. (pres/abs) Vacuum/I	Dust	(QTY)	D Pb TCLP (QTY) D Didyling Water D Ph (QTY) D Cu (QTY) D As (QTY)
Other (specify)(QTY) Qua	n. (s/area) Vacuum D5 n. (s/area)Dust D6480	5755-95 <u>. </u>	(QTY) (OTY)	☐ Drinkling Water ☐ Pb(QTY) ☐ Cu(QTY) ☐ As(QTY) ☐ Waster ☐ Pb(QTY) ☐ Cu(QTY) ☐ As(QTY)
PLM Rulk	TRM Water				☐ Pb Furnace (Mcdia)(QTY)
FPA Point Count (OTY)	Qua	l. (pres/abs) P 198.2/EPA 100.2	(QTY)	iem	Collection Apparatus for Spore Traps/Air Samples:
(OTY)		P 198.2/EPA 100.2 100.1	(Q1Y		Collection Media
Grav. Reduction BLAP 198.6 (QTY) Other (specify (QTY)	5	amples received in go		otherwise noted	☐ Spore-Trap (QTY) ☐ Surface Vacuum Dust (QTY) ☐ Surface Swab (QTY) ☐ Culturable ID Genus (Media (QTY))
MISC	(TEM	amples received in go Water samples	~c) oct condition ames	office wise flored.	Surface Swab (QTY) Columbia (Steels (Media) (QT)
☐ Vermiculite ☐ Asbestos Soil PLM_(Qual) PLM_(Quan) PLM/TEM(Qual					☐ Other (Specify)(QTY)
		GNADYS	IS)	MATRIX	CLIENT CONTACT
CLIENTID SAMPLE LOCATION	VOLUME WIPE	1 6 6 3	3 2 3		LABORATORY STAFF ONLY)
TOTAL PROPERTY.	TE (LITERS) AREA	1	 	Z Z	Date/Time: Contact: By:
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LABORATORY 2. Date/Time Analyzed;	<u> </u>	@ @	3y AVXXII - xri - 1	COPY	Sign: FOIA Requested Record Al-15-0085 (MI
May 2018 3. Results Reported To:		DES	TO THE TOTAL TOTAL		/ FLIA Requested Record #J-15-0085 (MI

AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



Client:

National Guard Bureau

Job Name:

Havre de Grace RC

Chain Of Custody:

516026

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

Havre de Grace, MD

Date Analyzed:

6/11/2013

State Military Reservation

Job Number:

Not Provided

Person Submitting:

Havre de Grace, Maryland 21078

P.O. Number:

W912K6-09-A-0003

Attention:

Summary of Polarized Light Microscopy

Page I of I

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Wool	Fiberglass Percent		Synthetic Percent			Sample Type	Sample Color	Homogeneity	Analyst ID	Comments
13067181	18	5	5		Sec. 1	155				1 <u>100</u>		95	SD	White	Homogeneous	LBP	
13067182	19 FT	4	4							-22	**	96	FT	Beige	Homogeneous	LBP	
13067183	19 M	5	5	••	0220		1440	**	3		**	92	MS	Black	Homogeneous	LBP	

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

- TEM RECOMMENDATION Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.
- MATRIX REDUCTION RECOMMENDATION Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected"

TR = "Trace equals less than 1% of this component"

Uncertainty: For samples containing asbestos in range of 1-10%

the CV is 0.43, 11-35% CV=0.55, >35 CV=0.23

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Technical Director

Peerawut Chaikeenee

Analyst(s)

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

Posted to NGB FOIA Reading Room May, 2018

NVLAP (IBESISAMAMABLETCOPYboratory

FOIA Requested Record #J-15-0085 (MD)

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Focused on Results www.amalab.com
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(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

516026

(304) 123 2010 (800) 4 10 10 10 10 10 10 10 10 10 10 10 10 10	Submittal Information:
Malling/Billing Information:	
1. Client Name: National Guard Bureau	Marrie de Crase mis
2. Address I: 301-IH Old Bay Lane	3. Job #:
3. Address 2: Alin: NGB-ARS-IRNE	4 Contact Pers On-Responsive @ physic 6460 649 6273
4. Address 3: Havre de Grace, Maryland 21076 5. Phone #: (410) 942-0273 Fax #: (410) 942-0254	5. Submitted
	ation (Results will be provided as soon as technically feasible):
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	3 Day Results Required By Noon Results Results Required By Noon Results Result
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ASBECTOS X 101 X 18 PCM Ajr. – Please Indicate Filter Type: ☐ BLAP I	198.4/Chatfield (QTY)
(OTY)	te PLM/TBM (QTY) UPb Dust Wipe (wipe type) (QTY)
☐ Fiberolate (OTY) ☐ Residua	al Ash(QTY)
TEM Air – Please Indicate Pitier Type: TEM Dust OTY) TO ONE (CONTY)	Pb TCLP (QTY)
AHERA	pres/abs) Vacuum/Dust (QTY)
U Other (specify Quan. (s	(s/area) Vacuum D5/35-95 (QTY)
PLM Bulk G BPA 600 – Visual Estimate (QTV) TEM Water G Dual (n	
□ EPA Point Count □ RLAP I	pres/abs) (QTY) (Q
Q NY State Friable 198.1 (QTY) PPA 100	Collection Média QTY) Surface Vacuum Dust QTY)
Other (specify)(QTY)	uples received in good condition unless otherwise noted. \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	ter samples °C)
MISC U-Vermiculite Q Asbestos Soil PAM_(Qual) PLM_(Quan) PLM/TEM_(Quan) PLM/TEM_(Quan)	Other (Specify)(QTY)
SANATURAN MADIAN PARTITION	CLIENT CONTACT
CLIENT ID SAMPLE LOCATION VOLUME WIPE NUMBER IDENTIFICATION DATE (LIERS) AREA	CLIENT CONTACT [ABORATORY STAFF ONLY)
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3 DAM MAD MOO!	
Y Deal Hall Top of Anna	Date/Time: Contact: By:
5 Dell Holl Bo Olher	X X X
6 Ding Rosso - HEATY God	
7 Ding Room Bar	
& Wall locker storage wastish	
9 Courses RAN HAVE floc!	X Date/Time: Contact: By:
10 Comoral Rose - Lower	X X X
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	3 @ 15'3 Fire (Pring): By (Pring): Sign: Long Ruluk
4 5 - W - DOVD 19 / 4 / 10	GOOD Via: FOOL By (Print): Sign:
Destad to NICD FOLK D2 Date/finns Analyzed: 12 /	(3) @ 15'3EM (AVAILABLE COPY) Date: 4 / 11 / 13 FOIA Requested Record #J-15-008X (MD) Time: Released by Natibilial Guard Bureau
May 2018 3, Results Reported by	AG PMAN Via: Email Date: 4 / 1/ / 3 FOIA Requested Record #J-15-0088 (MD)
(CUSTODY)	Pogo 2023 of 5260

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210 REV, 6.08

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(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

	(000) 3 10 0301 - 1 02	(201)	J)-201J												٠.		
Mailing/Billing Inform	ation:								nittal		natio	n:			مقد		·
I. Client Name: Natio									BNA								GIAN . RC
2. Address 1: 301-																	- MD
 Address 2:Attn; Address 3:Havre 	NGB-ARS-IHNE	·. · ·	· · · · · · · · · · · · · · · · · · ·				_	3. Jo	ob#:_							P	W912K6-09-A-0003
4. Address 3: Havre	a de Grace, Marylar	nd210	78		-		_ '	4. <u>C</u>	ontact	Perso) II	on-	-K	esi	oor	SI	VC @ pho Non-Responsive 273
5. Phone #: _(410) 942	2-0273	Fax	#:_(410)	942-025	4		. .	5. (S)	aliffic	cdby	9						19076
<u>,</u>	<u>.</u>		Repo	rting Info	rmatic	n (Re	sults	will I	e pro	vided	as 80	on as	techn	ically	feasil	le):	
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Ashesios Antiysis)				TEM Bulk										ALCONO.	15244781		
PCM Air - Please Indicate F	ilter Type:		*			A/Cha	Hield	٠.		OTS	7			4. Tale	d Ph Ps	<u>yaray</u> int Ch	hin f (OTV)
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AHERA	(QTY)			TEM Dust	al. (pres	4-1-3-1	1				(O)	v		ŗ	J Pb Sc L pk TY	il/Sol	(QTY)
☐ AHERA ☐ NIOSH 7402	(QTY)				an. (pres an. (s/ar										Drink	ing W	Vater DPb (OTY) DCir (OTY) DA: (OTY)
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Appendix B. Photographs



Exterior



Exterior damaged suspect asbestos shingles



Exterior front peeling paint



Exterior side of facility peeling paint



Exterior of facility suspect asbestos shingles and suspect lead-based paint on ground at drip line around the facility



Kitchen and dining area damaged 12"X12" suspect asbestos floor tile and mastic



Drill Hall



Water stained ceiling tiles throughout the facility

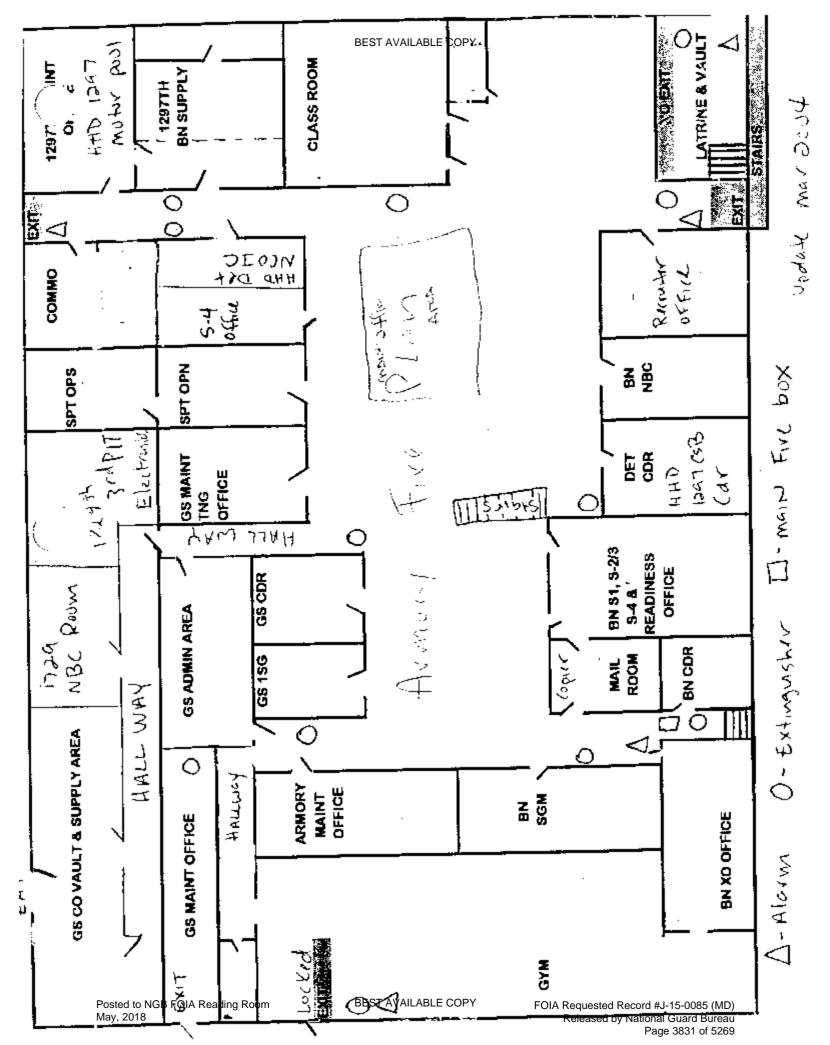


Effloresce on exterior wall in commo room



Converted firing range/office space hallway

Appendix C. Floor Plan





1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 215.699.4800

Fax: 215.699.8315

Daily Notes

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Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead.
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices, 2011 Edition.
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition.
- 4. American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Ventilation for Acceptable Indoor Air Quality, 62.1-2010.
- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. National Ambient Air Quality Standards (NAAQS) National primary ambient air quality standards for carbon monoxide 40 CFR 50.8.
- 9. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227(h) (3)].
- 10. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM).
- 11. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, February 2002.
- 12. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 Nov 06.
- 13. ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy, 55-2010.

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DEPARTMENT OF THE ARMY US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD

ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

May 2004

MEMORAND<u>UM FOR Army Nation</u>al Guard Bureau (NGB) Region North Industrial Hygiene NGB-AVS-SI-Non-Responsive, 301-IH Old Bay Lane, Havre de Grace, MD 21078

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Project No. 55-ML-01ED-03 BG William Smallwood Armory, La Plata, MD

- 1. Enclosed is a copy of subject report and one CD-ROM.
- 2. Please direct any additional comments or concerns to Ms. at DSN 584-5475/3118, commercial (410) 436-5475/3118 or e-mail address at esponsive@apg.amedd.army.mil.

ENCL



Industrial Hygienist Industrial Hygiene Field Services Program

Readiness thru Health

U.S. Army Center for Health Promotion and Preventive Medicine







MDARNG FACILITIES IH BASELINE SURVEY BG WILLIAM SMALLWOOD ARMORY LA PLATA, MD 55-ML-01ED-03











Approved for public release; distribution unlimited.

CHPPM FORM 432-E (MCHB-CS-IPD), OCT 03

Readiness Thru Health

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World War II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed \$3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/ supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- ♦ Integrity is the foundation
- ♦ Excellence is the standard
- Customer satisfaction is the focus
- ♦ Its people are the most valued resource
- ◆ Continuous quality improvement is its pathway

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army Imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization fiercely proud of its history, yet equally excited about the future. It is destined to continue its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.

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DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

EXECUTIVE SUMMARY MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS, BG WILLIAM SMALLWOOD ARMORY LA PLATA, MD PROJECT NO. 55-ML-01ED-03

1. PURPOSE OF EVALUATION. To conduct surveys at Army National Guard (ARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions at ARNG facilities. The survey will serve to establish a baseline so that a worker's history of exposures is provided for each civilian or military employee.

2. CONCLUSIONS.

- a. Indoor Air Quality. The armory meets the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE) recommended guidelines for air quality for carbon dioxide levels. The indoor carbon dioxide levels ranged from 399 to 671 parts per million (ppm). To alleviate occupant discomfort ASHRAE recommends that the carbon dioxide concentration in the room not exceed 700 ppm more than the outdoor ambient carbon dioxide concentration, which is approximately 350 ppm, totaling approximately 1050 ppm of carbon dioxide. The indoor temperature of 80.8 degrees Fahrenheit exceeds the recommended ASHRAE guidelines for an acceptable thermal environment. ASHRAE guidelines are between 73 and 79 degrees Fahrenheit in the summer and between 68 and 74.5 degrees Fahrenheit in the winter. The armory relative humidity of 72.7 % exceeded the recommended ASHRAE guidelines for air quality of 30 to 60 %.
- b. Lead. All air samples were below the laboratory analytical detection limit for lead in air of 3.0 to 15.0 μ g/m³. All samples were also below the Occupational Health and Safety Administration (OSHA) standard of 50μ g/m³ lead in air. One dust-lead wipe sample result, located on the motor maintenance bay table top by the outside door, exceeded the USACHPPM recommended decontamination level of 200μ g/ft² for dust-lead on frequently contacted surfaces. Two additional surface dust-lead wipe sample results exceeded the EPA lead exposure levels of 40μ g/ft² for children for dust-lead on floors. The first sample result was from the motor maintenance bay floor center by the office door, and the second from the former range lobby floor behind the door to the lobby.
- c. Asbestos Floor Tiles. The presumed asbestos floor tiles in the armory are intact. If they become damaged in the future the asbestos tiles may become friable and asbestos fibers may be released.

Readiness thru Health
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- d. Industrial Hygiene and Safety Programs. There is no Hazard Communication Program (HAZCOM) available for full time state workers who have oversight of the armory. They do have personal protective equipment (PPE) but no PPE program. They have material safety data sheets (MSDS) for the vehicle maintenance area of the facility.
- 3. RECOMMENDATIONS. The Department of Defense Risk Assessment Codes (RAC) for Health Hazards enables one to prioritize remedial action for hazards. Risk Assessments Codes range in magnitude from 1 to 5, with 1 being the highest priority.
- a. Lead RACs and Recommendations. The RAC for this armory for Lead Exposure is classified as 5. Clean all areas in and adjacent to the motor maintenance bay office and the former indoor firing range where sampling results showed elevated levels of lead. Comprehensive guidelines are in Appendix F. Consult with the Maryland Armory Environmental Coordinator concerning waste disposal requirements after cleanup. Apply a sealant to the area. These actions should be accomplished before allowing children into the area. The converted IFR should be sampled. Recleaning and sealing the IFR may further prevent lead from being redistributed into adjacent rooms and resulting in exposures for children and for the general workforce. A potential occupational exposure to lead has been identified for workers involved in renovation and abatement activities. These workers are required to be in compliance with the OSHA lead in construction standard 29 CFR 1926.62. There is a potential for personnel taking lead contamination out of the workplace into their vehicles and homes. Wear disposable gloves and disposable coveralls as extra protection when working in areas identified as having elevated levels of lead. Test drinking water from water fountains and faucets for lead. Address all potential lead hazards before extending this facility to use for children. If children continue to use this facility, clean surfaces to the EPA dust-lead standards for young children of $40\mu g/ft^2$ on floors and 250µg/ft² for dust-lead on window sills.
- b. The RAC for Indoor Air Quality is classified as 5. Install more air conditioning units or fans to cool the armory to between 73 and 79 degrees Fahrenheit in the summer. Maintain the temperature in the winter between 68 and 74.5 degrees Fahrenheit. To maintain the relative humidity between 30 and 60 % USACHPPM recommends either closing the windows and turning on the window air conditioning units or using a portable dehumidifier in the summer months.
- c. The RAC for Asbestos Exposure is classified as 5. The presumed asbestos tiles are intact. If they become damaged in the future the asbestos tiles may become friable and asbestos fibers may be released. Army policy requires the armory to establish and execute an asbestos hazard management plan for all asbestos in the facility, and to take immediate corrective action where a possible asbestos-related health hazard has been identified.

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EXSUM, MDARNG Facilities IH Baseline Surveys, BG William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

d. Industrial Hygiene and Safety Programs Recommendations. Provide a HAZCOM and Respiratory Protection Program for the full time state workers who oversee the armory. Provide a HAZCOM and Respiratory Protection Program for the full time state workers who oversee the armory.

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DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Project No. 55-ML-01ED-03

LOCATION: BG William Smallwood Armory, La Plata, MD

- 1. AUTHORITY. E-Mail dated 28 February 2003 from Ms Non-Responsive, Industrial Hygienist, MD Army National Guard, to the USACHPPM Industrial Hygiene Field Services Program.
- 2. PURPOSE OF EVALUATION. To conduct surveys at Army National Guard (ARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions at ARNG facilities. The survey will serve to establish a baseline so that a worker's history of exposures is provided for each civilian or military employee.

3. BACKGROUND INFORMATION.

- a. Armory Mission. Engineering Support to the 121st Engineering Battalion, Company A.
- a. Date of Construction. 1954.
- c. Survey date. September 3, 2003.
- d. POC. SGM Non-Responsive (410) 974-7400 Cell (443) 277-4923.
- e. USACHPPM did not evaluate any of the offices or converted IFR, except for the vehicle maintenance shop office, because the POC did not have access to any of the keys for the locked doors. The two state employees who had oversight of this facility recently left government service; the POC for this survey was the manager of the Prince Frederick Armory. The former IFR has been converted into a storage area for the Maryland Defense Office.

4. SUMMARY OF ACTIONS.

a. Sampling. Surface dust-lead wipe and lead in air sampling was conducted to determine the existence of lead-based paint and/or lead-based paint hazards (paint-lead hazards). Carbon dioxide (CO2), temperature and humidity measurements were collected to determine indoor air quality. Lighting conditions were measured. Sample locations are listed in Appendix D.

- b. Physical Condition of Facilities.
- (1) Paint. The paint condition is intact. Sergeant Non-Responsive, Environmental Compliance Assessment Coordinator for the MD NGB, stated that there are no records of lead-based paint abatement.
- (2) Asbestos. Staff Sergeant stated that there are no records of an asbestos abatement. The only potential asbestos containing building material identified is some 6 X 6 and 9 X 9 tile floor covering.
 - (3) Mold. No mold was observed.
 - (4) Safety Hazards. No safety hazards were observed.
 - c. Other Building Issues.
- d. Safety and Industrial Hygiene Programs. There are no written program records at the armory. There is no Hazard Communication Program (HAZCOM) available for full time state workers who have oversight of the armory. They do have personal protective equipment (PPE) but no PPE program. They have material safety data sheets (MSDS) for the vehicle maintenance area of the facility.
- e. Heating, Ventilation, and Air-conditioning System. There is no central ventilation and HVAC system. Ventilation and air are provided by window-mounted air conditioning units and the manual operation of windows when the building is not being heated.
 - f. Noise Dosimetry. No operation that could produce hazardous noise levels was identified.
- g. Lighting was measured in eight locations. Some measurements were taken with the lights off, because the rooms are normally used with the lights off.
- h. Converted indoor firing range (IFR). Staff Sergeant Non-Responsive, Environmental Compliance Assessment Coordinator for the MD NGB, stated that all lead was abated from the indoor firing range during its conversion.
 - i. Photographs (Appendix C).
 - j. Site maps (Appendix B).

- k. Facility use by children. The POC stated that the armory is used extensively by the community and has wide-ranging use by children. Youth groups play basketball on the drill floor.
- 5. ASSESSMENT CRITERIA FOR LEAD. (Appendix A).
- 6. SAMPLING RESULTS. The armory relative humidity of 72.7 % exceeded the recommended ASHRAE guidelines for air quality of 30% to 60 %. The indoor temperature of 80.5 degrees Fahrenheit exceeds the recommended ASHRAE guidelines. ASHRAE guidelines for an acceptable thermal environment are between 73-79 degrees Fahrenheit in the summer and between 68-74.5 degrees Fahrenheit in the winter.
- a. Indoor Air Quality: The indoor carbon dioxide levels met the ASHRAE recommended guidelines. The indoor carbon dioxide levels ranged from 399-671 parts per million (ppm). (See Table 1). To alleviate occupant discomfort ASHRAE recommends that the carbon dioxide concentration in the room not exceed 700 ppm more than the outdoor ambient carbon dioxide concentration, which is approximately 350 ppm. Therefore the total carbon dioxide concentration range should be between 350 and 1050 ppm.

Table 1: O-Trak Measurements for Indoor Air Quality

	Floor	Indoor Measurements	Outdoor Measurements
Lobby	First	530 parts per million (ppm) CO ₂	350 ppm CO ₂
Lounge/Training Room	First	660 ppm CO ₂	350 ppm CO ₂
Drill Floor (room)	First	438 ppm CO ₂	350 ppm CO ₂
Motor Maintenance Area	First	444 ppm CO ₂	350 ppm CO ₂
Motor Maintenance Office	First	623 ppm CO ₂	350 ppm CO ₂
Former Firing Range Area lobby	First	414 ppm CO ₂	350 ppm CO ₂
Office Area Corridor	First	399 ppm CO ₂	350 ppm CO ₂
Locker room	Second	671 ppm CO ₂	350 ppm CO ₂

b. Illumination. All areas of the armory are adequately lit and occupants reported no areas of deficient lighting. The lighting met the Illumination Engineering Society of North America Guidelines. (See Table 2).

Table 2: Lighting Measurements

Location	Floor	Measurement	Guidelines
Locker Room	Second	8.41 Foot Candles (FC)	10 FC
Office Area Corridor	Second	5.50 FC	5 FC
Former Firing Range Area	First	75.0 FC	20 FC
lobby			
Drill Floor	First	4.1 FC (no lights on)	10 FC
Motor Maintenance Office	First	42.5 FC	20-50 FC
Lounge/Training Room	First	7.6 FC	10-20 FC
Lobby	First	14.5 FC	10 FC
Office Area Corridor	First	7.5 FC	5 FC

c. Lead. All air samples are below the laboratory analytical detection limit for lead in air of 3.0 to $15.0\mu g/m^3$. This is also below the Occupational Health and Safety Administration (OSHA) standard of $50\mu g/m^3$ for lead in air. One dust-lead wipe sample result, located on the motor maintenance bay table top by the outside door, exceeded the USACHPPM recommended decontamination level of $200\mu g/ft^2$ for dust-lead on frequently contacted surfaces. (photo # 0943). Two additional surface dust-lead wipe sample results exceeded the EPA lead exposure levels of $40\mu g/ft^2$ for children for dust-lead on floors. The first sample result was from the motor maintenance bay floor center by the office door (photo # 0944), and the second from the former range lobby floor behind the door to the lobby (photo # 0950). (See Table 3).

TABLE 3: Lead Air and Dust Wipe Results

Lead Sample Numbers	Type of Sample	Location	Floor	Photo Numbers	Results
LP W01	Wipe	Lounge/Training Room table wall next to door to drill room	First	0940	11 μg/ft²
LP W02	Wipe	Lounge/Training Room floor by door to lobby	First	0941	<2.8 μg/ft²
LP W03	Wipe	Lounge/Training Room chair by window	First	0942	7 μg/ft²
LP W04	Wipe	Motor Maintenance Bay table top by outside door	First	0943	1400 µg/ft²
LP W05	Wipe	Motor Maintenance Bay floor center by office door	First	0945	88 μg/ft²
LP W06	Wipe	Motor Maintenance Bay floor by press	First	0946	18 μg/ft²
LP W07	Wipe	Motor Maintenance Office desk top	First	0946	5.5 μg/ft ²
LP W08	Wipe	Motor Maintenance Office floor center far wall	First	0947	<2.8 μg/ft²
LP W09	Wipe	Kitchen table top	First	0948	3.4 µg/ft ²
LP W10	Wipe	Former Range Lobby floor in front of cage door	First	0949	38 μg/ft²
LP W11	Wipe	Former Range Lobby floor behind door to lobby	First	0950	81 µg/ft²
LP W12	Wipe	Drill Room starter table top	First	0951	4 μg/ft ²
LP W13	Wipe	Drill Room floor center court	First	0952	4 μg/ft²
LP W14	Wipe	Drill Room floor by door to former range lobby door	First	0953	9.9 μg/ft²
LP W15	Wipe	Locker Room table top near front of building	Second	0954	5.7 μg/ft²
LP W16	Wipe	Locker Room floor center of room	Second	0955	<2.8 μg/ft ²
30903RR01	Air	Lounge/Training Room bar	First	0938	<14 mg/m ³
30903RR02	Air	Former Range Lobby cage door	First	0939	<15 mg/m³

7. DISCUSSION AND CONCLUSIONS.

a. The armory relative humidity of 72.7 % exceeded the recommended ASHRAE guidelines for air quality of 30-60 %. The indoor temperature of 80.5 degrees Fahrenheit exceeds the recommended ASHRAE guidelines. ASHRAE guidelines for an acceptable thermal environment are between 73-79 degrees Fahrenheit in the summer and between 68-74.5 degrees Fahrenheit in the winter.

The indoor carbon dioxide levels met the ASHRAE recommended guidelines. The indoor carbon dioxide levels ranged from 399-671 ppm. To alleviate occupant discomfort ASHRAE recommends that the carbon dioxide concentration in the room not exceed 700 ppm more than the outdoor ambient carbon dioxide concentration, which is approximately 350 ppm. Therefore, the total carbon dioxide concentration range level should be between 350 and 1050 ppm in this armory.

- b. All air samples are below the laboratory analytical detection limit for lead in air of $3.0 \text{ to } 15.0 \mu \text{g/m}^3$. This is also below the Occupational Health and Safety Administration (OSHA) standard of $50 \mu \text{g/m}^3$ for lead in air. One dust-lead wipe sample result, located on the motor maintenance bay table top by the outside door, exceeded the USACHPPM recommended decontamination level of $200 \mu \text{g/ft}^2$ for dust-lead on frequently contacted surfaces. (photo # 0943). Two additional surface dust-lead wipe sample results exceeded the EPA lead exposure levels of $40 \mu \text{g/ft}^2$ for children for dust-lead on floors. The first sample result was from the motor maintenance bay floor center by the office door (0944), and the second from the former range lobby floor behind the door to the lobby (0950). AR 420-70 states that the purpose of Army lead hazard management is to protect children from all sources of lead exposure. However, its provisions only control these exposures, and do not eliminate them. Recleaning and sealing former firing range area may further prevent exposures for children under six and for the general workforce.
- c. There are presumed asbestos floor tiles in the armory. The presumed asbestos tiles are intact. If they become damaged in the future the asbestos tiles may become friable and asbestos fibers may be released.
- d. There is no Hazard Communication Program (HAZCOM) available for full time state workers who have oversight of the armory. They do have personal protective equipment (PPE) but no PPE program. They have material safety data sheets (MSDS) for the vehicle maintenance area of the facility.

- 8. RECOMMENDATIONS. Enclosure.
- 9. ADDITIONAL ASSISTANCE. For additional assistance, or questions concerning this report, please contact the undersigned at DSN 584-3118, commercial 410-436-3118, or by e-mail Non-Responsive page, amedd.army.mil.



INDUSTRIAL HYGIENIST
USACHPPM LEAD AND ASBESTOS TEAM LEADER
Industrial Hygiene Field Services Program
EPA AHERA Asbestos Inspector and Management Planner/
Certification Number MD-070340
EPA Lead Inspector and Lead Risk Assessor/
Certification Number 04-7913

MDARNG Facilities IH Baseline Surveys, BG William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

ENCLOSURE

LA PLATA ARMORY RECOMMENDATIONS

The Department of Defense Instruction Number (DODI) 6055.1 provides Risk Assessment Codes (RAC) for Health Hazards, a procedure which allows us to assess the magnitude of exposure to physical, chemical, and biological agents and the possible medical effects of exposure. The RAC is an expression of the risk associated with the hazard and combines the hazard severity and accident probability into a single numeral. RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority. The RAC for this armory for Lead Exposure is classified as 5. The RAC for Indoor Air Quality is classified as 5. The RAC for Asbestos Exposure is classified as 5.

1. Indoor Air Quality. RAC 5.

- a. Install more air conditioning units or fans to cool the armory to between 73 and 79 degrees Fahrenheit in the summer. Maintain the temperature in the winter between 68 and 74.5 degrees Fahrenheit.
- b. To maintain the relative humidity between 30 and 60 %, USACHPPM recommends either closing the windows and turning on the window air conditioning units or using a portable dehumidifier in the summer months.

2. Lead Exposure. RAC 5.

- a. Clean all areas in and adjacent to the motor maintenance bay office and the former indoor firing range where sampling results showed elevated levels of lead. Comprehensive guidelines are in Appendix F. Consult with the Maryland Armory Environmental Coordinator concerning waste disposal requirements after cleanup. Apply a sealant to the area. These actions should be accomplished before allowing children into the area. The converted IFR should be sampled. Recleaning and sealing the IFR may further prevent lead from becoming redistributed into adjacent rooms and resulting in exposures for children and for the general workforce.
- b. A potential occupational exposure to lead has been identified for workers involved in renovation and abatement activities. These workers are required to be in compliance with the OSHA lead in construction standard 29 CFR 1926.62.
- c. There is a potential for personnel taking lead contamination out of the workplace into their vehicles and homes. Wear disposable gloves and disposable coveralls as extra protection when working in areas identified as having elevated levels of lead.

MDARNG Facilities IH Baseline Surveys, BG William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

- d. Test drinking water from water fountains and faucets for lead. It could not be determined if this has been done.
- e. Address all potential lead hazards before extending this facility to use for children. If children will be using this facility, clean surfaces to the EPA dust-lead standards for young children of $40\mu g/ft^2$ on floors and $250\mu g/ft^2$ for dust-lead on window sills.
- 3. Asbestos Exposure. RAC 5.

The presumed asbestos tiles are intact. If they become damaged in the future the asbestos tiles may become friable and asbestos fibers may be released. Army policy requires the armory to establish and execute an asbestos hazard management plan for all asbestos in the facility, and to take immediate corrective action where a possible asbestos-related health hazard has been identified.

4. Other Recommendations. Provide a HAZCOM and Respiratory Protection Program for the full time state workers who oversee the armory.

MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX A

ASSESSMENT CRITERIA FOR LEAD

Subject: Proposed Recommendations for Surface Lead in Armories

- 1. In armories that do not contain childcare facilities, the NGB Region North Industrial Hygiene Office recommends cleaning the areas in which sample results are greater than $200 \,\mu\text{g/ft}^2$. This guidance is based on professional judgment, risk assessments, adaptation of OSHA guidance, and feasibility of cleaning to a certain level.
- a. EPA standards (40 CFR 745.227(e)(8)(viii))are not directly applicable because they are developed for floors (40 μ g/ft²), windowsills (250 μ g/ft²) and window troughs (400 μ g/ft²) in residential and childcare facilities. Most of the wipe samples in armories were collected in undisturbed areas and therefore, results are worst case scenarios and do not correlate to these standards.
- b. OSHA has no specific requirement for work area surfaces. The lead standard (29 CFR 1910.1025(h)) states that all surfaces shall be maintained as free as practicable of accumulations of lead. In workplaces where lead is generated, surface levels may be much higher, but personnel exposures can be controlled by limiting airborne lead levels and following good cleanup and hygienic practices.
- c. OSHA used to cite a level of 200 μ g/ft² in their Technical Manual and 29 CFR 1926.62 as guidance to its own inspectors for evaluating the cleanliness of lunchroom and locker room surfaces that are supposed to be kept as clean as possible.
- d. In a report titled Derivation of Wipe Surface Screening Levels for Environmental Chemicals, USACHPPM has determined that $200~\mu g/ft^2$ is a safe surface contamination level. They have also applied these standards as the decontamination levels for surfaces in administrative offices.
- e. It should be noted that levels above these recommendations do not necessarily mean there is a significant hazard to workers who are following good cleaning and hygienic practices since there is no correlation between wipe and air samples. Rather, we recommend these levels as a precautionary measure.
- 2. The NGB Occupational Health Branch is developing guidance for armories that are used as childcare facilities. All states will receive this guidance when it is completed.
- 3. Ambient air samples collected in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m³ averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead in this building.

MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX B

SITE MAPS

MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX C

PHOTOGRAPHS

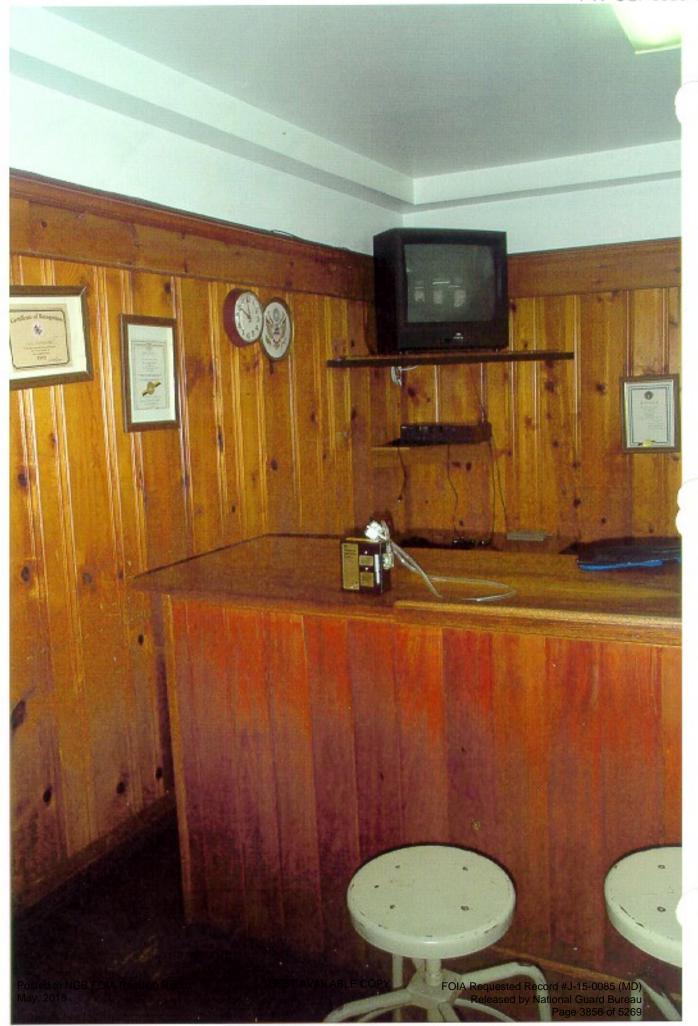
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First	0941
First	0942
First	0943
First	0945
First	0946
First	0946
First	0947
First	0948
First	0949
First	0950
First	0951
First	0952
First	0953
Second	0954
Second	0955
First	0938
First	0939
	First



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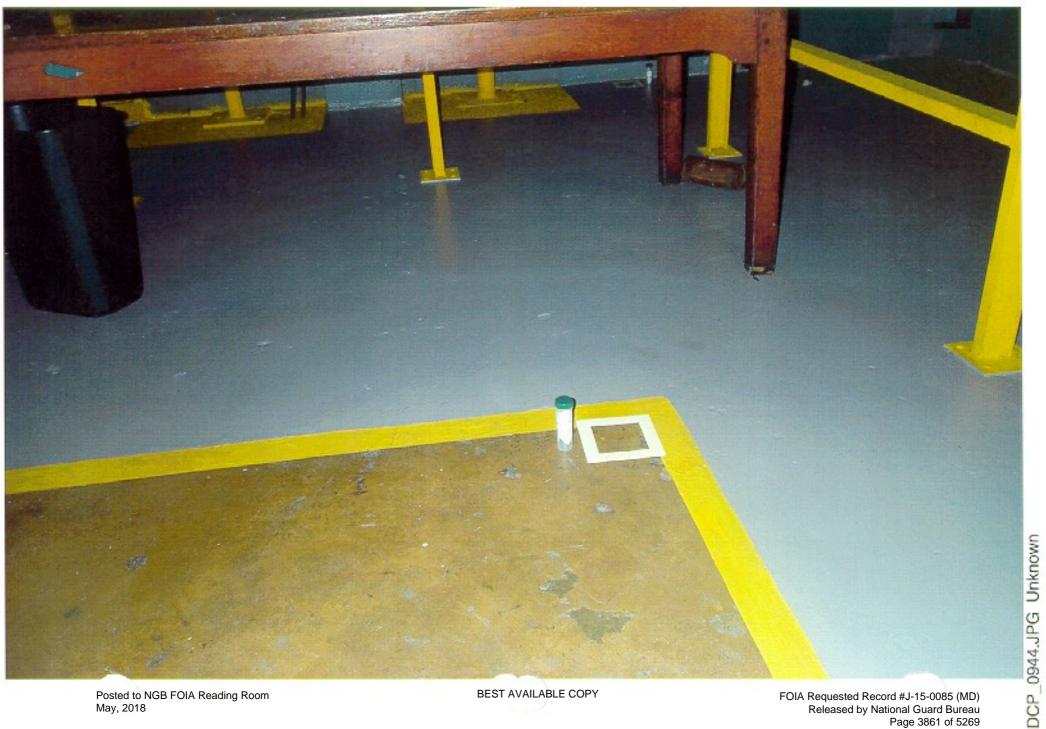
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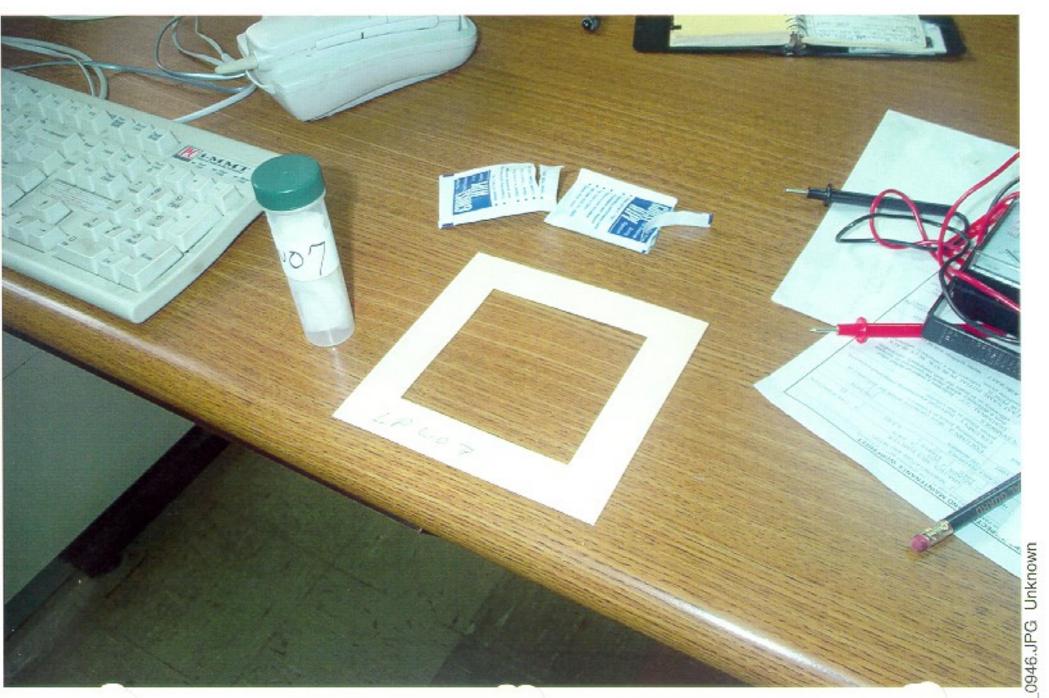
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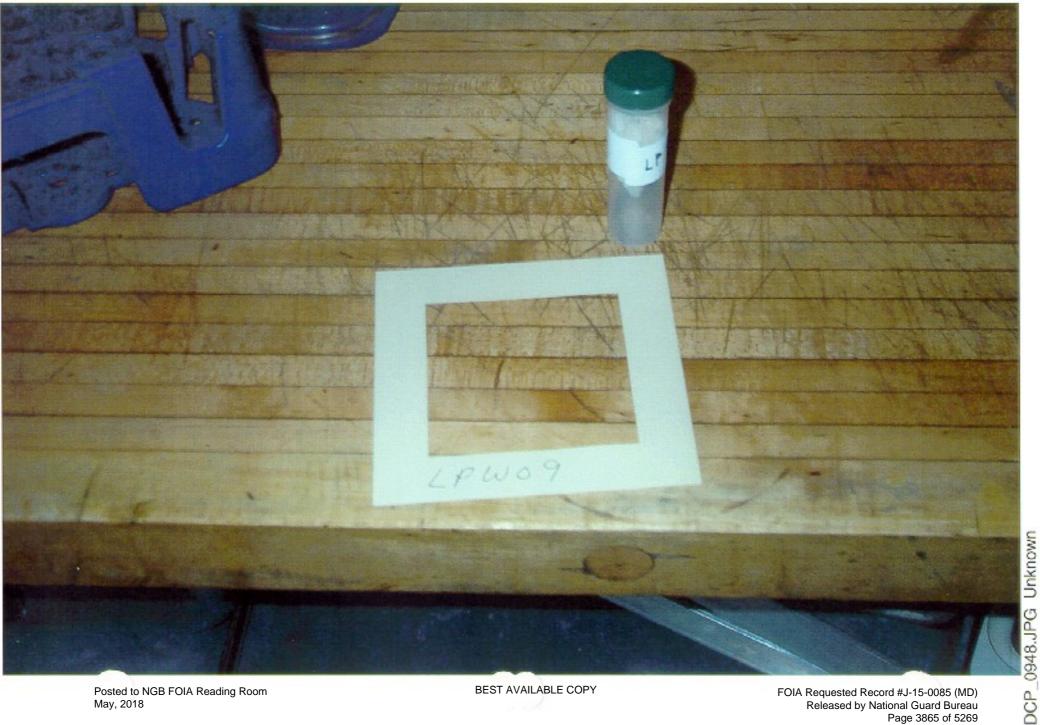
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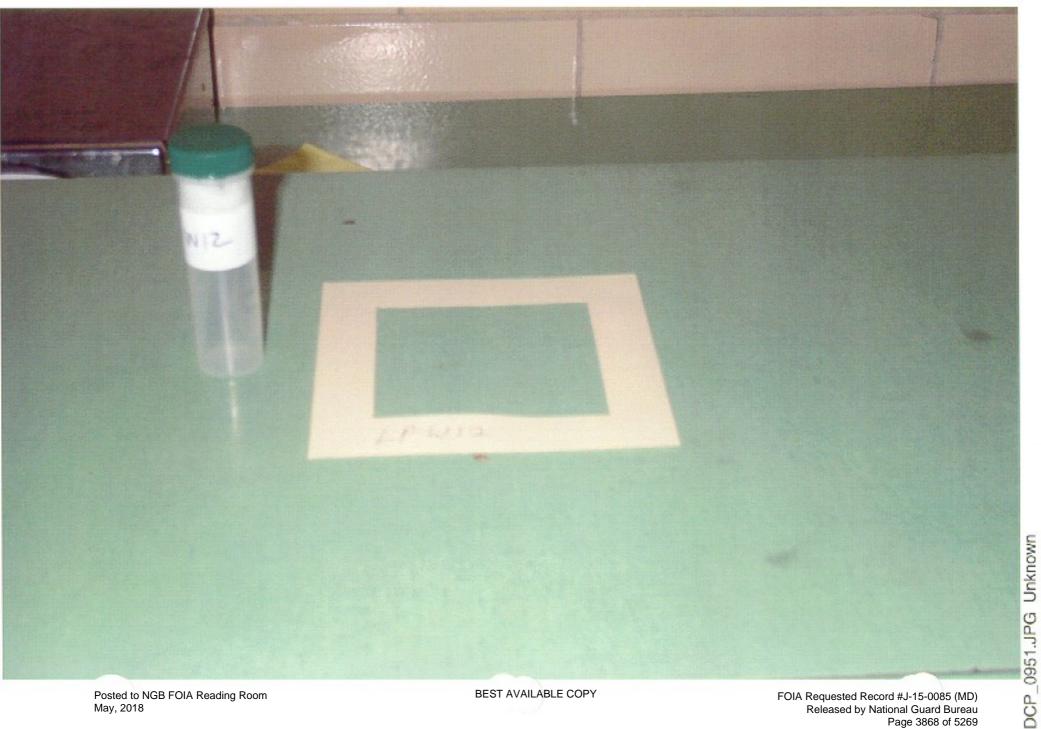
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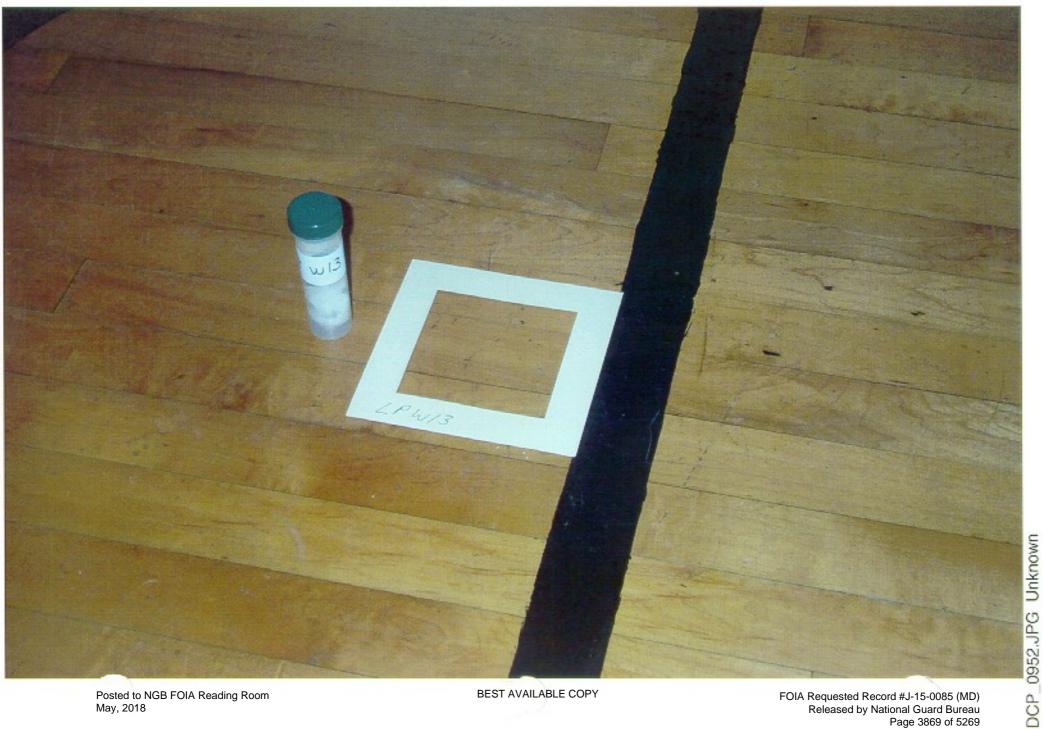
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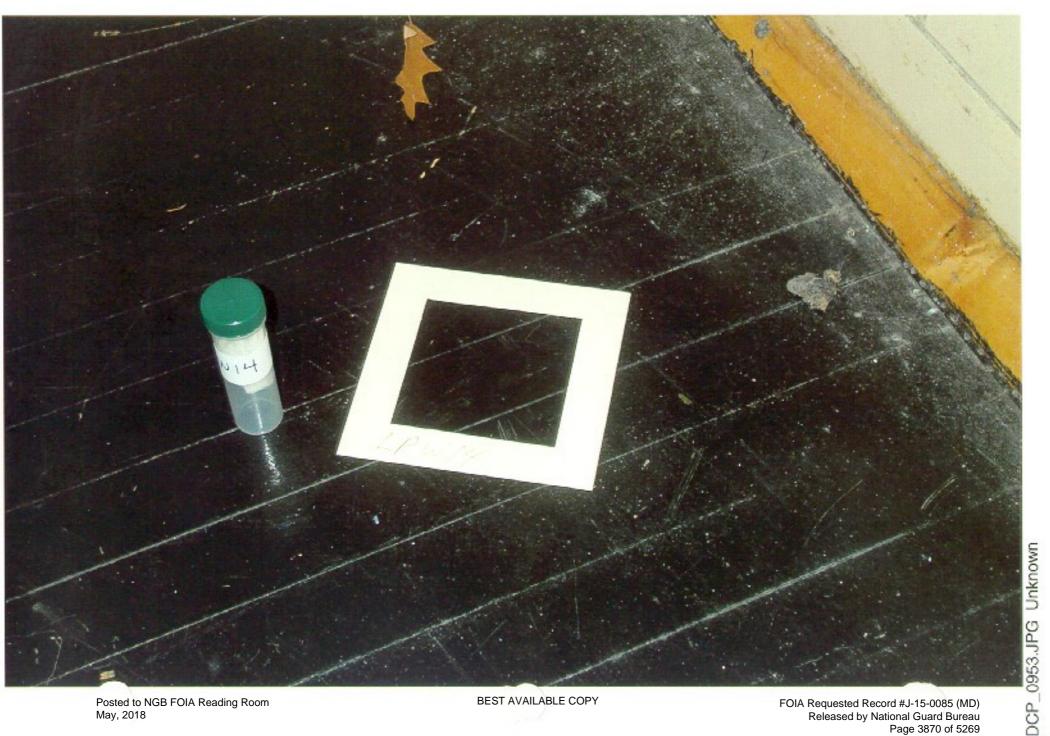
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MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX D

SAMPLING SHEETS AND LAB ANALYSES



			Indoor Re	nge li	nfo				
Wipe Sample #	Armory	City	Active	Inactive	N/A	Cleaned?	Location of Samples	Floor	Conc. (pg/ft¹)
LP WOI	La Pial a	LaPlats		Yes			Lounge/Training Room table wall next to door to drill room	First	11
LP W02	LaPlata	LaPiata					Lounge/Training Room floor by door to lobby	First	<2.8
LP W03	LaPiata	LaPlata	_	 			Lounge/Training Room chair by window	First	7
LP W04	LaPlata	LaPlata					Motor Maintenance Bay table top by outside door	First	1400
LP W05	LaPtata	LaPlata					Motor Maintenance Bay floor center by office door	First	និង
LP W06	LaPlata	LaPlata					Motor Maintenance Bay floor by press	First	18
LP W07	LaPlata	LaPlata					Motor Maintenance Office desk top	First	5.5
LP W08	LaPista	LaPlata					Motor Maintenance Office floor center far wall	First	<2.8
LP W09	LaPlata	LaPlata			\Box		Kitchen table top	First	3.4
LP W10	LaPlata	LaPfata					Former Range Lobby floor in front of cage door	First	38
LP WII	LaPlata	LaPtala					Former Range Lobby floor behind door to lobby	First	81
LP W12	LaPlata	LaPlata		1			Drill Room starter table top	First	<2.8
LP W13	LaPlata	LaPtata		1			Drill Room floor center court	Pirst	4
LP W14	LaPlata	LaPiata					Drill Room floor by door to former range lobby door	First	9.9
LP W15	LaPtata	LaPlata					Locker Room table top near front of building	Second	5.7
LP W16	LaPtala	LaPlata			\Box		Locker Room floor center of room	Second	<2.8

Lead Sample Numbers	Type of Sample	Location	Floor	Photo Numbers
LP W01	Wipe	Lounge/Training Room table wall next to door to drill room	First	0940
LP W02	Wipe	Lounge/Training Room floor by door to lobby	First	0941
LP W03	Wipe	Lounge/Training Room chair by window	First	0942
LP W04	Wipe	Motor Maintenance Bay table top by outside door	First	0943
LP W05	Wipe	Motor Maintenance Bay floor center by office door	First	0945
LP W06	Wipe	Motor Maintenance Bay floor by press	First	0946
LP W07	Wipe	Motor Maintenance Office desk top	First	0946
LP W08	Wipe	Motor Maintenance Office floor center far wall	First	0947
LP W09	Wipe	Kitchen table top	First	0948
LP W10	Wipe	Former Range Lobby floor in front of cage door	First	0949
LP W11	Wipe	Former Range Lobby floor behind door to lobby	First	0950
LP W12	Wipe	Drill Room starter table top	First	0951
LP W13	Wipe	Drill Room floor center court	First	0952
LP W14	Wipe	Drill Room floor by door to former range lobby door	First	0953
LP W15	Wipe	Locker Room table top near front of building	Second	0954
LP W16	Wipe	Locker Room floor center of room	Second	0955
30903RR01	Air	Lounge/Training Room bar	First	0938
30903RR02	Air	Former Range Lobby cage door	First	0939

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory



CERTIFICATE OF ANALYSIS



Client:

US Army - CHPPM

Job Name:

MD Amg/LaPlata

Chain Of Custody:

117743

Address:

Attn: MCHB-TS-OFS, 5158 Blackhawk Road

Job Location:

Not Provided

Date Analyzed:

09/18/2003

Aberdeen Proving Grounds, Maryland 21010-5403

Job Number:

Not Provided

Person Submitting:

Non-Responsiv

21070 010

P.O. Number:

Not Provided

Report Date:

22-Sep-03

Attention:



Page I of 2

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)		orting imit	F	inal Res	ult	Comment	S
	LP Blank 1	Furnace	Wipe Blank	****	N/A	0.30			0.3			
0368063	LP W01			****	0.108		ug (01	<		ug /62		
		Furnace	Wipe	****		2.79	ug/ft²		11	ug/fl²		
0368064	LP W02	Furnace	Wipe		0.108	2.79	ug/ft²	<	2.8	ug/fl²		
0368065	LP W03	Furnace	Wipe	****	0.108	2.79	ug/ft²		7	ug/ft²		
0368066	LP W04	Flame	Wipe	****	0.108	111.52	ug/ft²		1400	ug/ft²		
0368067	LP W05	Furnace	Wipe	****	0.108	69.70	ug/ft²		88	ug/fl²		
0368068	LP W06	Furnace	Wipe	****	0.108	2.79	ug/ft²		18	ug/ft²		
0368069	LP Blank 2	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug		
0368070	LP W07	Furnace	Wipe	****	0.108	2.79	ug/ft²		5.5	ug/ft²		
0368071	LP W08	Furnace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/ft²		
0368072	LP W09	Furnace	Wipe	****	0.108	2.79	ug/ft²		3.4	ug/ft²		
0368073	LP W10	Fumace	Wipe	****	0.108	6.97	ug/ft²		38	ug/fl²		
0368074	LP Blank 3	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug		
0368075	LP W11	Furnace	Wipe	****	0.108	69.70	ug/ft²		81	ug/ft²		
0368076	LP W12	Furnace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/fl²		
0368077	LP W13	Furnace	Wipe	****	0.108	2.79	ug/ft²		4	ug/ft²		
0368078	LP W14	Furnace	Wipe	****	0.108	2.79	ug/ft²		9.9	ug/ft²		
0368079	LP W15	Furnace	Wipe	****	0.108	2.79	ug/ft²		5.7	u g/ ft²		
0368080	LP Blank 4	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug		
0368081	LP W16	Furnace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/ft²		

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and lability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVI.AP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples.







Client:

US Army - CHPPM

Job Name:

MD Amg/LaPlata

Chain Of Custody:

117743

Address:

Attn: MCHB-TS-OFS, 5158 Blackhawk Road

Job Location: Not Provided Date Analyzed:

09/18/2003

Aberdeen Proving Grounds, Maryland

Job Number:

Not Provided

Person Submitting:

21010-5403

P.O. Number:

Not Provided

Report Date:

22-Sep-03

Attention:



Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample Number

Client Sample Number

Analysis Type

Sample Type

Air Volume (L)

Area Wiped (ft²)

Reporting Limit

Final Result

Comments

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B

N/A = Not Applicable

mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)

%Pb = percent lead by weight

ug = micrograms

ug/L = parts per billion (ppb)

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Technical Manager:

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Client:

US Army - CHPPM

Job Name:

MD Arng/LaPlata

Chain Of Custody:

117743

Address:

Attn: MCHB-TS-OFS, 5158 Blackhawk Road

Job Location:

Not Provided

Date Analyzed:

9/18/2003

Aberdeen Proving Grounds, Maryland 21010-5403

Job Number:

Not Provided

Person Submitting:

P.O. Number:

Not Provided

Report Date:

18-Sep-03

Attention:



Page I of 2

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Client Sample	Client Sample	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft ²)	Repo	orting mit	i	inal Res	ult	Comments
0368062		Furnace	Wipe Blank	****	N/A		ug	<	0.3	ug			
0368063	LP W01	Furnace	Wipe	****	0.108	2.79	ug/ft²		11	ug/ft²			
0368064	LP W02	Furnace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/ft²			
0368065	LP W03	Furnace	Wipe	****	0.108	2.79	ug/ft²		7	ug/ft²			
0368066	LP W04	Flame	Wipe	****	0.108	111.52	ug/ft²		1400	ug/ft²			
0368067	LP W05	Furnace	Wipe	****	0.108	69.70	ug/ft²		88	ug/ft²			
0368068	LP W06	Furnace	Wipe	****	0.108	2.79	ug/ft²		18	ug/ft²			
0368069	LP Blank 2	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug			
0368070	LP W07	Furnace	Wipe	****	0.108	2.79	ug/ft²		5.5	ug/ft²			
0368071	LP W08	Fumace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/ft²			
0368072	LP W09	Furnace	Wipe	****	0.108	2.79	ug/ft²		3.4	ug/ft²			
0368073	LP W10	Fumace	Wipe	****	0.108	6.97	ug/ft²		38	ug/ft²			
0368074	LP Blank 3	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug			
0368075	LP W11	Furnace	Wipe	****	0.108	69.70	ug/ft²		81	ug/ft²			
0368076	LP W12	Furnace	Wipe	****	0.108	2.79	ug/ft²		4	ug/ft²			
0368077	LP W13	Furnace	Wipe	****	0.108	2.79	ug/ft²		4	ug/ft²			
0368078	LP W14	Furnace	Wipe	****	0.108	2.79	ug/ft ^z		9.9	ug/ft²			
0368079	LP W15	Furnace	Wipe	****	0.108	2.79	ug/fl²		5.7	ug/ft²			
0368080	LP Blank 4	Furnace	Wipe Blank	****	N/A	0.30	ug	<	0.3	ug			
0368081	LP W16	Furnace	Wipe	****	0.108	2.79	ug/ft²	<	2.8	ug/ft²			

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An AlHA (#8863), NVLAP (# 101143), & New York ELAP (#10920) Accredited Laboratory







Client:

US Army - CHPPM

Job Name:

MD Amg/LaPlata

Chain Of Custody:

117743

Address:

Attn: MCHB-TS-OFS, 5158 Blackhawk Road

Not Provided Job Location:

Date Analyzed:

9/18/2003

Aberdeen Proving Grounds, Maryland

Job Number:

Not Provided

Person Submitting:

21010-5403

P.O. Number:

Not Provided

Report Date:

18-Sep-03

Attention:



Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample Number

Client Sample Number

Analysis Type

Sample Type

Air Volume (L)

Area Wiped (ft³)

Reporting Limit

Final Result

Comments

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B

N/A = Not Applicable

mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)

%Pb = percent lead by weight

ug = micrograms Note: All results have two significant digits. Any additional digits shown should not be

ug/L = parts per billion (ppb)

considered when interpreting the result.

Technical Manager: G Edward Carney

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Page 1 of 1

Client:

US Army - CHPPM

Job Name:

Laplata/Prince Frederick

Chain Of Custody:

117740

Address:

Attn: MCHB-TS-OFS, 5158 Blackhawk Road

Job Location: Not Provided Date Analyzed:

09/17/2003

Aberdeen Proving Grounds, Maryland

Job Number:

Not Provided

Person Submitting:

21010-5403

P.O. Number:

Not Provided

Report Date:

17-Sep-03

Attention:



Summary of Atomic Absorption Analysis for Lead

AMA Sample	Client Sample Number	Analysis Type	Sample Type				nments			
							·	· · · · · · ·		· · · · · · · · · · · · · · · · · · ·
0368002	30903RR01	Flame	Air	216	N/A	13.89 ug/m³	· • <	14	ug/m³	
0368003	30903RR02	Flamé	Air	206	N/A	14.56 ug/m³	<	15	ug/m³	
0368004	30903RR03BL	Flame	Air Blank	0	N/A	3.00 ug/m³	<	3	ug	
0368005	30903RR04	Flame	Air	226	N/A	13.27 ug/m³	<	13	ug/m³	
0368006	30903RR05	Flame	Air	222	N/A	13.51 ug/m³	<	14	ug/m³	
0368007	30903RR06BL	Flame	Air Blank	0	N/A	3.00 ug/m³	. <	3	ug	

Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B

Analysis Method For Furnace: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B

N/A = Not Applicable

%Pb = percent lead by weight

mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm) ug = micrograms

ug/L = parts per billion (ppb)

Note: All results have two significant digits. Any additional digits shown should not be

considered when interpreting the result.

Technical Manager: G Edward Carney

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MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX E

REFERENCES

APPENDIX E

REGULATIONS AND STANDARDS

- 1. Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Administration, current ed. http://www.osha.gov/comp-links.html.
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MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX F

LEAD CLEANING GUIDANCE





CHAPTER 14: CLEANING

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Step-by-Step Summary



Cleaning: How To Do It

- Include step-by-step procedures for precleaning, cleaning during the job, and daily and final cleanings in project design or specifications.
- 2. Assign responsibilities to specific workers for cleaning and for maintaining cleaning equipment.
- 3. Have sufficient cleaning equipment and supplies before beginning work.
- 4. If contamination is extensive, conduct precleaning of the dwelling unit. Move or cover all furniture and other objects.
- Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust.
 Decontamination of all tools, equipment, and worker protection gear is required before it leaves containment areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
- 6. Schedule sufficient time (usually 30 minutes to an hour) for a complete daily cleaning, starting at the same time near the end of each workday after lead hazard control activity has ceased.
- For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
- Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
- Wash all surfaces with a lead-specific detergent, high-phosphate detergent, or other suitable cleaning agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every room is cleaned.
- 10. Repeat step 8. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed (see Chapter 11). Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not overexposed.
- 11. After final cleaning, perform a visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work. This visual examination should be performed by the owner or an owner's representative who is independent of the lead hazard control contractor.
- 12. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after the other construction work has been completed.
- 13. Paint or otherwise seal treated surfaces and interior floors.
- 14. Conduct a clearance examination (see Chapter 15).
- 15. If clearance is not achieved, repeat the final cleaning.



-Step-by-Step Summary (continued) -



- 16. Continue clearance testing and repeated cleaning until the dwelling achieves compliance with all clearance standards. As an incentive to conduct ongoing cleaning and a thorough final cleaning, the cost of repeated cleaning after failing to achieve clearance should be borne by the contractor as a matter of the job specification, not the owner.
- 17. Do not allow residents to enter the work area until cleaning is completed and clearance is established.
- 18. Cleaning equipment list:
 - ♦ HEPA vacuums.
 - Detergent.
 - ♦ Waterproof gloves.
 - Rags.
 - Sponges.
 - Mops.
 - Buckets.
 - ♦ HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs).
 - 6-mil plastic bags.
 - Debris containers.
 - Waste water containers.
 - Shovels.
 - Rakes.
 - Water-misting sprayers.
 - 6-mil polyethylene sheeting (or equivalent).





I. Introduction

This chapter describes cleaning procedures to be employed following abatement and interim control work. Dust removal as an interim control measure is covered in Chapter 11.

All lead hazard control activities can produce dangerous quantities of leaded dust. Unless this dust is properly removed, a dwelling unit will be more hazardous after the work is completed than it was originally. Once deposited, leaded dust is difficult to clean effectively. Whenever possible, ongoing and daily cleaning of leaded dust during lead hazard control projects is recommended. Ongoing and daily cleaning is also necessary to minimize worker exposures.

Cleaning is the process of removing visible debris and dust particles too small to be seen by the naked eye. Removal of lead-based paint hazards in a dwelling unit will not make the unit safe unless excessive levels of leaded dust are also removed. This is true regardless of whether the dust was present before or generated by the lead hazard control process itself. Improper cleaning can increase the cost of a project considerably because additional cleaning and clearance sampling will be necessary. However, cleaning and clearance can be achieved routinely if care and diligence are exercised.

A. Performance Standard

Although the cleaning methods described in this chapter are feasible and have been shown to be effective in meeting clearance standards, other methods may also be used if they are safe and effective. This performance-oriented approach should stimulate innovation, reduce cost, and ensure safe conditions for both residents and workers.

B. Small Dust Particles

Dust particles that are invisible to the naked eye remain on surfaces after ordinary cleaning procedures. A visibly clean surface may contain high and unacceptable levels of dust particles and require special cleaning procedures.

C. Difficulties in Cleaning

While cleaning is an integral and essential component of any lead hazard control activity, it is also the most likely part of the activity to fail.

Several common reasons for this failure include low clearance standards, worker inexperience, high dust-producing methods, and deadlines.

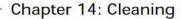
1. Low Clearance Standards

Because very small particles of leaded dust are easily absorbed by the body when ingested or inhaled, a small amount can create a health hazard for young children. Therefore, "clearance standards" are extremely low for acceptable levels of leaded dust particles on surfaces after hazard control activities, and careful cleaning procedures are required. Although it is not possible to remove all leaded dust from a dwelling, it is possible to reduce it to a safe level.

Clearance standards are described more fully in Chapter 15. The permissible amount of leaded dust remaining on each of the following surfaces following lead hazard work is as follows:

- 100 μg/ft² on floors.
- 500 μg/ft² on interior window sills (stools).
- 800 μg/ft² on window troughs (the area where the sash sits when closed).
- 800 μg/ft² on exterior concrete.

These levels are based on wipe sampling.
Clearance testing determines whether the premises or area are clean enough to be reoccupied after the completion of a lead paint hazard control project. A cleaned area may not be reoccupied until compliance with clearance standards has been established. To prevent delays, final testing and final cleaning activities should be coordinated.







2. Worker Inexperience

To understand the level of cleanliness required to meet the established clearance standards for hazard control cleanup, new hazard control personnel often require a significant reorientation to cleaning. Many construction workers are used to cleaning up only dust that they can see, not the invisible dust particles that are also important to remove.

3. High Dust-Producing Methods and/or Inadequate Containment

High dust-generating methods, inadequate containment during hazard control work, and poor work practices can all make achievement of clearance particularly difficult. Work practices necessary to prevent spreading of dust throughout a dwelling (e.g., by tracking dust out of work areas) are essential but sometimes tedious. Essential work practices are sometimes mistakenly considered to be "flexible guidelines" rather than necessary standards that are designed to ensure that the job is completed, not only safely, but also on time and within budget.

4. Deadlines

Daily and final cleanings have sometimes been compromised due to project deadlines, since cleaning comes at the end of the job. Hurried efforts often result in clearance failure. Delayed and over-budget hazard control projects are often the result of repeated, unplanned recleanings that are necessitated by inadequate containment and sloppy work practices.

II. Coordination of Cleaning Activities

A. Checklist

The owner or contractor may use the following cleaning checklist before any lead hazard control activity:

- ✓ Is the critical importance of cleaning in a hazard control project understood?
- √ Have all workers been trained and certified for hazard control work?

- Have the precleaning, daily, and final cleanings been scheduled properly and coordinated with the other participants in the hazard control process?
- ✓ Have cleaning equipment and materials been obtained?
- ✓ Do the workers know how to operate and maintain special cleaning equipment, and do they have directions for the proper use of all cleaning materials?
- ✓ Have all workers carefully studied the step-by-step procedures for precleaning (if needed), in-progress cleaning, and daily and final cleanings?
- ✓ Are all workers properly protected during the cleaning processes (see Chapter9)?
- ✓ Have provisions been made to properly contain and store potentially hazardous debris (see Chapter 10)?
- ✓ Have dust-clearance testing and related visual inspections been arranged (see Chapter 15)?
- ✓ Are the clearance criteria to be met fully understood?
- ✓ Have all appropriate surfaces been properly painted or otherwise sealed?
- ✓ Have appropriate records been maintained that document participants' roles in the hazard control project?

B. Equipment Needed for Cleaning

The following equipment is needed to conduct cleaning: high-efficiency particulate air (HEPA) vacuums and attachments (crevice tools, beater bar for cleaning rugs), detergent, waterproof gloves, rags, sponges, mops, buckets, 6-mil plastic bags, debris containers, waste water containers, shovels, rakes, water-misting sprayers, and 6-mil polyethylene plastic sheeting (or equivalent).





C. Waste Disposal

Regulations governing hazardous and nonhazardous waste storage, transportation, and disposal affect both the daily and final cleaning procedures. The hazard control contractor and the disposal contractor should work together to establish formal written procedures, specifying selected containers, storage areas, and debris pickups, to ensure that all relevant regulations are met.

III. Cleaning Methods and Procedures

Many of the special cleaning methods and procedures detailed in this chapter are not standard operating procedure for general home improvement contractors. Therefore, project designers, responsible agencies, or owners must ensure that contractors follow the methods and procedures recommended herein or specially designed alternative procedures, even though some may appear to be redundant and unnecessary. These methods have been shown to be feasible and effective in many situations and skipping steps in the cleaning procedures can be counterproductive.

A. Containment

Because of the difficulty involved in the removal of fine dust, dust generated by hazard control work should be contained to the extent possible to the inside of work areas. Inadequately constructed or maintained containment or poor work practices will result in additional cleaning efforts, due to dust that has leaked out or been tracked out of the work area (see Chapter 8).

B. Basic Cleaning Methods: Wet Wash and Vacuum Cleaning Techniques

Because leaded dust adheres tenaciously, especially to such rough or porous materials as weathered or worn wood surfaces and masonry surfaces (particularly concrete), workers should be trained in cleaning methods. As a motivator,

some contractors have awarded bonuses to workers who pass clearance the first time.

Two basic cleaning methods have proven effective, when used concurrently, in lead-based paint hazard control projects: a special vacuum cleaner equipped with a HEPA exhaust filter, followed by wet washing with special cleaning agents and rinsing, followed by a final pass with the HEPA vacuum.

Although HEPA filtered vacuums and triso-dium phosphate (TSP) cleaners have been considered the standard cleaning tools for lead hazard control projects, new research, discussed under the "Alternatives Methods" section in this chapter, suggests that other tools and products may also be effective in efficiently cleaning dust while providing adequate worker protection from airborne exposure risks. Some of these innovations may even be superior.

1. HEPA Vacuuming

HEPA vacuums differ from conventional vacuums in that they contain high-efficiency filters that are capable of trapping extremely small, micron-sized particles. These filters can remove particles of 0.3 microns or greater from air at 99.97 percent efficiency or greater. (A micron is 1 millionth of a meter, or about 0.00004 inches.) Some vacuums are equipped with an ultra-low penetration air (ULPA) filter that is capable of filtering out particles of 0.13 microns or greater at 99.9995 percent efficiency. However, these ULPA filters are slightly more expensive, and may be less available than HEPA filters.

Vacuuming with conventional vacuum machines is unlikely to be effective, because much of the fine dust will be exhausted back into the environment where it can settle on surfaces. A recent Canadian study revealed that finedust air levels were exceedingly high when a standard portable vacuum with a new bag was used, although partially filled bags were found to be more efficient (CMHC, 1992). Considerations for the proper use of a HEPA vacuum are listed below.







Operating Instructions

There are a numerous manufacturers of HEPA vacuums. Although all HEPA vacuums operate on the same general principle, they may vary considerably with respect to specific procedures, such as how to change the filters. To ensure the proper use of equipment, the manufacturer's operating instructions should be carefully followed and if possible, training sessions arranged with the manufacturer's representative.

Although HEPA vacuums have the same "suction" capacity as ordinary vacuums that are comparably sized, their filters are more efficient. Improper cleaning or changing of HEPA filters may reduce the vacuum's suction capability.

Special Attachments

Because the HEPA vacuum will be used to vacuum surfaces other than floors, operators should buy attachments and appropriate tool kits for use on different surfaces—such as brushes of various sizes, crevice tools, and angular tools.

Selecting Appropriate Size(s)

HEPA vacuums are available in numerous sizes, ranging from a small lunchbucket-sized unit to track-mounted systems. Two criteria for size selection are the size of the job and the type of electrical power available. Manufacturer recommendations should be followed.

Wet-Dry HEPA Vacuums

Some hazard control contractors have found the wet-dry HEPA vacuums to be particularly effective in meeting clearance standards. These vacuums are equipped with a special shut-off float switch to protect the electrical motor from water contact.

Prefilters

HEPA filters are usually used in conjunction with a prefilter or series of prefilters that trap the bulk of the dust in the exhaust airstream, particularly the larger particles. The HEPA filter traps most of the remaining small particles that have passed through the prefilter(s). All filters must be maintained and replaced or

cleaned as specified in the manufacturer's instructions. Failure to do so may cause a reduction in suction power (thus reducing the vacuum's efficiency and effectiveness). Failure to change prefilters may damage the vacuum motor and will also shorten the service life of the HEPA filter, which is far more expensive than the prefilters.

HEPA Vacuuming Procedures

Surfaces frequently vacuumed include ceilings, walls, floors, windows, interior and exterior sills, doors, heating, ventilation, and air conditioning (HVAC) equipment (heating diffusers, radiators, pipes, vents), fixtures of any kind (light, bathroom, kitchen), built-in cabinets, and appliances.

To aid in dislodging and collecting deep dust and lead from carpets, the HEPA vacuum must be equipped with a beater bar (agitator head) that is fixed to the cleaning head. This bar should be used on all passes on the carpet face during dry vacuuming (see Chapter 11 for details on carpet and furniture cleaning).

All rooms and surfaces should be included in the HEPA vacuum process, except for those that (1) were found not to have lead-paint hazards and were properly separated from work areas before the process began (see Chapter 8), or (2) were never entered during the process. Porches, sidewalks, driveways, and other exterior surfaces should be vacuumed if exterior hazard control work was conducted, or if debris was stored or dropped outside. Vacuuming should begin on the ceilings and end on the floors, sequenced to avoid passing through rooms already cleaned, with the dwellings' entryway cleaned last.

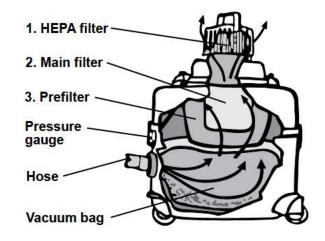
Emptying the HEPA Vacuum

Used filters and vacuumed debris are potentially hazardous waste and should be treated accordingly (see Chapter10). Therefore, operators should use extreme caution when opening the HEPA vacuum for filter replacement or debris removal to avoid accidental release of accumulated dust into the environment. This may occur, for example, if the vacuum's seal has been broken and the vacuum's bag is disturbed.





Figure 14.1a Vacuum With a HEPA Filter.



Parts of a HEPA-vacuum

Most HEPA-vacuums have three filters: HEPA filter, main filter, and prefilter. Debris gets sucked in through the hose into the vacuum bag. The air and dust get filtered through the prefilter, the main filter, and the HEPA filter. The HEPA filter captures the lead dust before the air is released into the work area again.

Operators should also wear a full set of protective clothing and equipment, including appropriate respirators, when performing this maintenance function, which should be done in the containment area or offsite.

2. Wet Detergent Wash

Several types of detergents have been used to remove leaded dust. Those with a highphosphate content (containing at least 5 percent trisodium phosphate, also known as TSP) have been found to be effective when used as part of the final cleaning process (Milar, 1982). TSP detergents are thought to work by coating the surface of dusts with phosphate or polyphosphate groups which reduces electrostatic interactions with other surfaces and thereby permits easier removal. Because of environmental concerns some States have restricted the use of TSP, and some manufacturers have eliminated phosphates from their household detergents. However, high-TSP detergents can usually be found in hardware stores and may be permitted for limited use, such as lead hazard control.

Other non-TSP cleaning agents developed specifically for removing leaded dust have also been found to be effective (possibly more effective than TSP) in limited trials by several



Figure 14.1b Pressure Gauge Indicator Shows When Filters Require Changing.

14-9

Pressure

gauge





Figure 14.2 HEPA Vacuum Sizes and Tools.

investigators (Grawe, 1993; Wilson, 1993) and may also be safer, since TSP is a skin and eye irritant. See section VII for more information on non-TSP detergents. Proper procedures for using high-phosphate detergents also apply to most other types of detergents and include the following steps:

Manufacturer's Dilution Instructions

Users of cleaning agents for leaded dust removal should follow manufacturer's instructions for the proper use of a product, especially the recommended dilution ratio. Even diluted, trisodium phosphate is a skin irritant and users should wear waterproof gloves. Eye protection should also be worn, and portable eyewash facilities should be located in or very near the work area. Consult manufacturer's directions for the use of other detergents.

Appropriate Cleaning Equipment

Because a detergent may be used to clean leaded dust from a variety of surfaces, several types of application equipment are needed, including cleaning solution spray bottles, wringer buckets, mops, variously sized hand sponges, brushes, and rags. Using the proper equipment on each surface is essential to the quality of the wetwash process.

Proper Wet-Cleaning Procedures

At the conclusion of the active lead hazard control process and the initial HEPA vacuuming, all vacuumed surfaces should be thoroughly and completely washed with a high-phosphate solution or other lead-specific cleaning agent (or equivalent) and rinsed. Select a detergent that does not damage existing surface finishes (TSP may damage some finishes). Work should proceed from ceilings to floors and sequenced to avoid passing through rooms already cleaned.

Changing Cleaning Mixture

Many manufacturers of cleaners will indicate the surface area that their cleaning mixture will cover. To avoid recontaminating an area by cleaning it with dirty water, users should follow manufacturer-specified surface-area limits. However, regardless of manufacturers' recommendations, the cleaning mixture should be changed after its use for each room. As a rule of thumb, 5 gallons should be used to clean no



Figure 14.3 Goggles, Face Shields, Gloves, and Eye Wash Facilities Should Be Available When Used With Chemicals Such as TSP.









Latex





Neoprene Nitrile

more than 1,000 square feet. Used cleaning mixture is potentially hazardous waste (see Chapter 10); consult with your local water and sewage utility for directions on its proper disposal. Wash water should never be poured onto the ground. The wash water is usually filtered and then poured down a toilet (if the local water authority approves).

3. The HEPA/Wet Wash/HEPA Cycle

Typical Procedures

The usual cleaning cycle that follows lead hazard control activities is called the HEPA vacuum/wet wash/HEPA cycle and is applied to an entire affected area as follows:

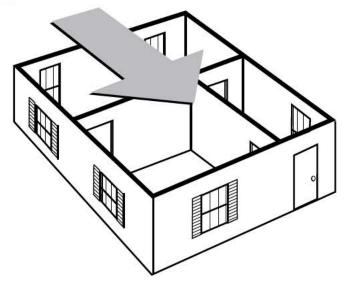
First, the area is HEPA vacuumed.



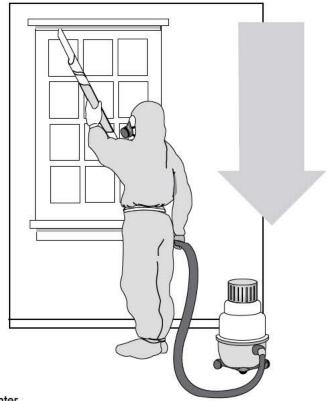


Figure 14.4a The HEPA Vacuum, Wet Wash, HEPA Vacuum Cycle Helps in Meeting Clearance Standards.

HEPA vacuum all surfaces Start at the end farthest from the main entrance/exit. As you vacuum, move towards the main exit and finish there.



Begin at the top of each room and work down. For example, start with the top shelves, the top of the woodwork, and so on, and work down to the floor. Do every inch of the windows, especially the window troughs.



Courtesy: Alice Hamilton Occupational Health Center





- Next, the area is washed down.
- After drying, the area is again HEPA vacuumed.

The rationale for this three-pass system is as follows:

- The first HEPA vacuum removes as much dust and remaining debris as possible.
- The wet wash further dislodges dust from surfaces.
- The final HEPA cycle removes any remaining particles dislodged but not removed by the wet wash.

Single-Pass Wet Wash/HEPA Vacuum

Some lead hazard control contractors have found HEPA spray cleaner vacuums to be a cost-effective alternative to the three-pass system. Similar to home carpet-cleaning machines, these vacuums simultaneously deliver a solution to the surface and recover the dirty solution. Theoretically, this process combines two of the steps in the HEPA vacuum/wet wash/HEPA cycle into one step. While anecdotal evidence indicates that the spray cleaner wet wash/HEPA is effective for some uses, limitations have been noted in its use for ceilings, vertical surfaces, and hard to reach areas. This device may be used as long as clearance standards are met.

Figure 14.4b (continued)

Use special attachments

Use the rubber cone where the floor meets the baseboard and along all the cracks in the floor boards. Use the brush tool for walls and woodwork.

Use the wheeled floor nozzle for bare floors and the carpet beater for rugs.

Move slowly

Vacuum slowly so the HEPA vacuum can pick up all the lead dust.



Rubber Cone

Dust Brush



Powered Carpet Beater



Wheeled Floor Nozzle





Figure 14.4c (continued)

Wash all surfaces with suitable detergents

Wash all surfaces in the work area with suitable detergents, including areas that had been covered with plastic. Some wallpaper should only be HEPA vacuumed, since it may be damaged by the detergent.



Wipe All Surfaces



Wet Mop Floor



Don't Dry Sweep





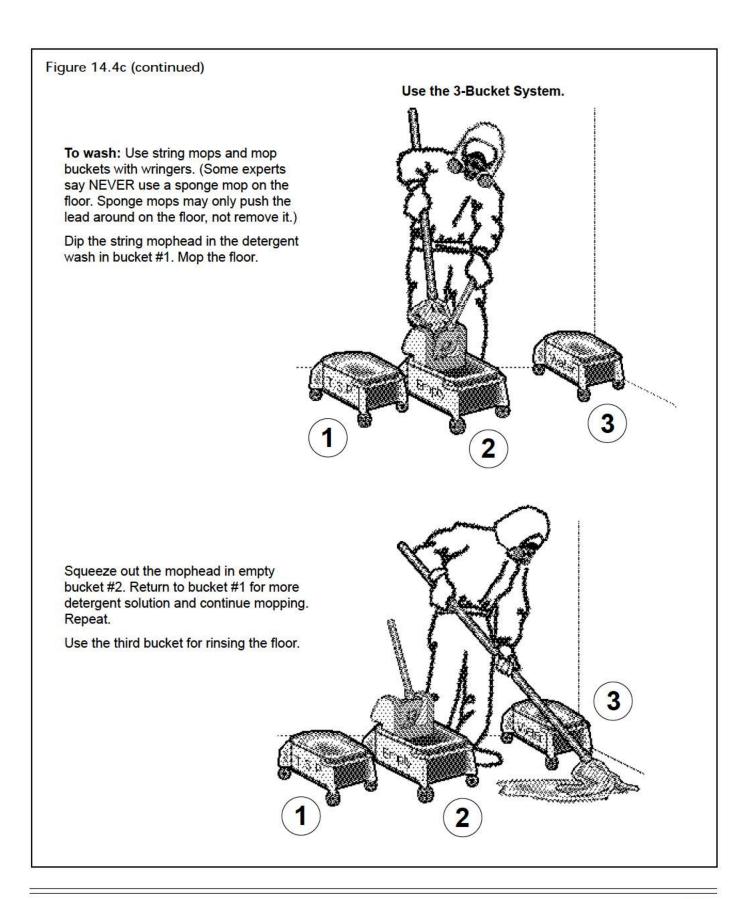


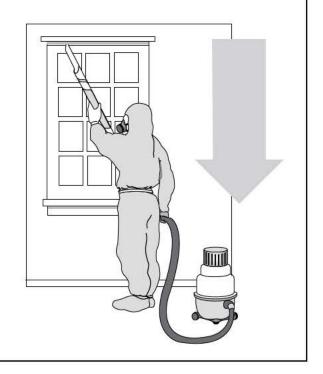




Figure 14.4d (continued)

HEPA vacuum all surfaces a final time HEPA vacuum *all surfaces* in the work area, including areas that had been covered with plastic.

Starting at the far end, work towards the decontamination area. Begin with ceilings or the top of the walls and work down, cleaning the floors last. Do every inch of the windows, especially the troughs. Use the corner tool to clean where the floor meets the baseboard and all the cracks in the floor boards. Use the brush tool for the walls. Move slowly and carefully to get all the dust.



4. Sealing Floors

Before clearance, all floors without an intact, nonporous coating should be coated. Sealed surfaces are easier for residents to clean and maintain over time than those that are not sealed. Wooden floors should be sealed with a clear polyurethane or painted with deck enamel or durable paint. Vinyl tile, linoleum, and other similar floors should be sealed with an appropriate wax. Concrete floors should be sealed with a concrete sealer or other type of concrete deck enamel. However, if these floors are already covered by an effective coat of sealant, it may be possible to skip this step.

As an alternative to sealing, floors may be covered with new vinyl tile, sheet vinyl, linoleum flooring, or the equivalent to create a more permanent cleanable surface. New surfaces should be cleaned with a cleaning solution that is appropriate for that type of surface.

IV. Order of Cleaning Procedures During Lead Hazard Control

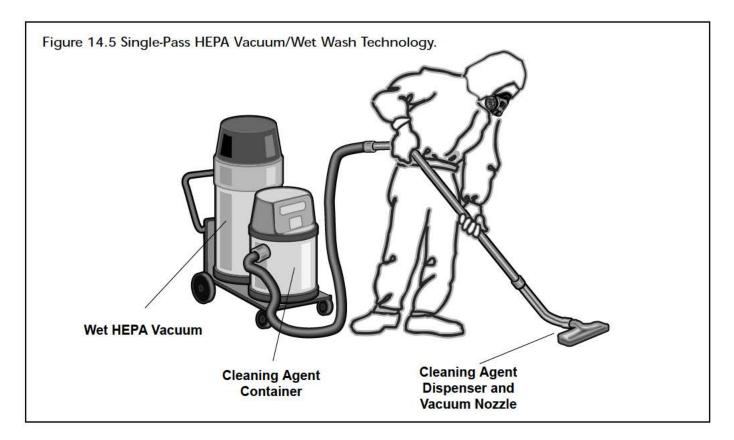
The special cleaning procedures to be followed during a lead-based paint hazard control project are discussed in chronological order below. Skipping steps in the process may result in failure to meet post-lead hazard control clearance standards.

A. Precleaning Procedures

Precleaning (i.e., cleaning conducted before lead hazard control is begun) is necessary only in dwelling units that are heavily contaminated with paint chips. Precleaning involves the removal of large debris and paint chips, followed by HEPA vacuuming. These steps may be followed by removal of occupant personal possessions, furniture, or carpeting, depending on the







Worksite Preparation Level selected (see Chapter 8). If the furniture will not be cleaned, it should be removed from the area or covered with plastic prior to beginning the precleaning procedure. Carpeting should always be misted before its removal to control the generation of hazardous dust.

It is usually the resident's responsibility to remove most of his or her personal possessions. However, if necessary, owners or project management should be prepared to complete this activity before lead hazard control work begins. As a last resort, the contractor may pack any remaining belongings and carefully seal and move the boxes, supplying all necessary boxes, packing materials, and staff to complete the task. Following cleaning and clearance, the contractor should return all packed items to their appropriate places. Leaving these tasks to the contractor may be expensive and inefficient, since the contractor will need to be insured for this function if the occupant's



Figure 14.6 Precleaning Is Needed in Areas Where Contamination and Deterioration Are High.



belongings are damaged. Additionally, moving furniture, rugs, drapes, and other items owned by the occupant could increase leaded dust levels. Clearance should be conducted after cleaning but before resident items are moved back in.

B. Ongoing Cleaning During the Job

Periodic HEPA vacuuming during the lead hazard control work may be necessary to minimize tracking of dust and paint chips from one area to another (e.g., when a large amount of paint chips or dust is being generated).

C. Daily Cleaning Procedures

Cleaning activity should be scheduled at the end of each workday when all active lead hazard control throughout the dwelling has ceased. Sufficient time must be allowed for a thorough and complete cleaning (usually about 30 minutes to an hour). Daily cleaning helps achieve clearance dust levels by minimizing problems that may otherwise occur during final cleaning and limiting worker exposures. While daily cleaning can be skipped in vacant dwelling units, it is required when occupants will



Figure 14.7 Plastic Sheeting Should Be Repaired as Part of Daily Cleanup.

return in the evening. Under no circumstances should debris or plastic be left outside overnight in an unsecured area, even if the dwelling is vacant. Daily cleaning should consist of:

- Removing large debris.
- Removing small debris.
- HEPA vacuuming, wet clean, HEPA vacuuming (horizontal surfaces only).
- Cleaning exterior.
- Patching and repairing plastic sheeting.
- Securing debris/plastic.

1. Large Debris

Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to a secure area on the property designated for waste storage. All sharp corners, edges, and nails should be hammered down to prevent injury and minimize the tearing of plastic. It is not necessary to wrap each individual piece of debris in plastic if the entire load can be wrapped. A secure area either outside or inside the property must be designated as a temporary waste-storage area. Covered, secured, and labeled dumpsters placed on or near the property may be used. Proper segregation of waste should be enforced at this time (see Chapter 10).

2. Small Debris

After being misted with water, small debris should be swept up, collected, and disposed of properly. The swept debris should be placed in double 4-mil or single 6-mil polyethylene (or equivalent) plastic bags, properly sealed, and moved to the designated trash storage area. Trash bags should not be overloaded; overloaded bags may rupture or puncture during handling and transport.

3. Exterior Cleaning

Areas potentially affected by exterior lead hazard control should be protected via a containment system (see Chapter 8). Because weather can adversely affect the efficacy of exterior





containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleaning, the immediate area should be examined visually to ensure that no debris has escaped containment. Any such debris should be raked or vacuumed and placed in single 6-mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris. HEPA vacuuming is appropriate for hard exterior surfaces, not soil.

4. Worker Protection Measures

General worker protection measures are discussed in Chapter 9. Studies indicate that during daily cleaning activities, especially while wet sweeping, workers may be exposed to high levels of airborne dust. Therefore, workers should wear protective clothing and equipment, especially appropriate respirators.

5. Maintaining Containment

The integrity of the plastic sheeting used in a lead hazard control project must be maintained. During their daily cleaning activities, workers should monitor the sheeting and immediately repair any holes or rips with 6-mil plastic and duct tape.

V. Order of Final Cleaning Procedures After Lead Hazard Control

Before treated surfaces can be painted or sealed, final cleaning procedures must be completed. Because airborne dust requires time to settle, the final cleaning process should start no sooner than 1 hour after active lead hazard control has ceased in the room. See Appendix 11 for details regarding dust settling.

A. Final Cleaning

As the first stage in the final cleaning, floor plastic should be misted and swept as detailed earlier in this chapter. Upper-level plastic, such as that on cabinets and counters, should be removed first, after it has been misted with water and cleaned. All plastic should be folded

carefully from the corners/ends to the middle to trap any remaining dust. Next, remove both layers of plastic from the floor.

Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after the cleaning and removal of other plastic sheeting; these sheets may then be misted, cleaned, and removed last.

Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plastic-removal process usually requires workers to use protective clothing and respirators.

After the plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle, starting with the ceiling and working down to the floor. After surfaces are repainted or sealed, a final HEPA/wet wash/HEPA cycle may be necessary if accumulated dust caused by other work is visible.

1. Decontamination of Workers, Supplies, and Equipment

Decontamination is necessary to ensure that worker's families, other workers, and subsequent properties do not become contaminated. Specific procedures for proper decontamination of equipment, tools, and materials prior to their removal from lead hazard control containment areas should be implemented, as described below and in Chapters 9 and 10.

Work clothing, work shoes, and tools should not be placed in a worker's automobile unless they have been laundered or placed in sealed bags. All vacuums and tools that were used should be wiped down using sponges or rags with detergent solutions.

Consumable/disposable supplies, such as mop heads, sponges, and rags, should be replaced, after each dwelling is completed. Soiled items should be treated as contaminated debris (see Chapter 10).







Figure 14.8a Pick Up Corners of Plastic Sheeting.



Figure 14.8b Fold Plastic Inward.

Durable equipment, such as power and hand tools, generators, and vehicles, should be cleaned prior to their removal from the site; the cleaning should consist of a thorough HEPA vacuuming followed by washing.

B. Preliminary Visual Examination

After the preliminary final cleaning effort is completed, the certified supervisor should visually evaluate the entire work area to ensure that all work has been completed and all visible dust and debris have been removed. While the preliminary examination may be performed by the lead hazard control supervisor, contractor, or owner as a preparatory step before the final clearance examination, it does not replace the independent visual assessment conducted during clearance.

If the visual examination results are unsatisfactory, affected surfaces must be retreated and/or recleaned. Therefore, it is more cost effective to have the supervisor rather than the clearance examiner perform this initial examination.

C. Surface Painting or Sealing of Nonfloor Surfaces

The next step of the cleaning process is painting or otherwise sealing all treated surfaces except floors.

Surfaces, including walls, ceilings, and woodwork, should be coated with an appropriate primer and repainted. Surfaces enclosed with vinyl, aluminum coil stock, and other materials traditionally not repainted are exempt from the painting provision.

D. Final Inspection

The final clearance evaluation should take place at least 1 hour after the final cleaning. Clearance has three purposes: 1) to ensure that the lead hazard control work is complete, 2) to detect the presence of leaded dust, and 3) to make sure that all treated surfaces have been repainted or otherwise sealed. Clearance is usually performed after the sealant is applied to the floor. See Chapter 15 for information on clearance examination procedures.

E. Recleaning After Clearance Failure

If after passing the final visual examination, the dwelling unit fails the clearance wipe dust tests,





the HEPA/wet wash/HEPA cleaning cycle should be carefully and methodically repeated. Failure is an indication that the cleaning has not been successful. Recleaning should be conducted under the direct supervision of a certified supervisor. Care should be exercised during the recleaning of "failed" surfaces or components to avoid recontaminating "cleared" surfaces or components.

VI. Cleaning Cost Considerations

An important consideration in determining lead hazard control strategies and methods is the cost and difficulty of required daily and final cleanup operations and the ease with which one can meet dust-clearance standards. A general rule of thumb is that lead hazard control strategies that generate the most dust will have higher cleanup costs and higher initial clearance test-failure rates.

A. Initial Clearance Test Failure Rates

The likelihood of passing final dust-clearance tests is highly correlated with the chosen intervention strategy, methods, and care exercised by the contractor. For example, in one study (HUD, 1991) initial wipe-test failure rates were 14 percent for interior window sills, 19 percent for floors, and 33 percent for window troughs. The pass/fail rates for each surface were strongly associated with the dwelling unit abatement strategy employed. Chemical removal and hand-scraping strategies experi-enced higher failure rates than replacement and encapsulation/enclosure strategies (see Table 14.1).

However, results of the HUD demonstration project indicated that clearance failure is not solely related to abatement method. The report stated that "the diligence and effectiveness of an abatement contractor's cleaning process ... had a major impact on ... the likelihood of the dwelling unit to pass the final wipe test clearance" (HUD, 1991).



Figure 14.8c Dispose of Plastic Sheeting in a Plastic Trash Bag.

B. Key Factors In Effective Cleaning

Effective cleaning will be aided by adequate sealing of surfaces with polyethylene sheeting prior to lead hazard control, proper daily cleaning practices, good worker training, and attention to detail. Where poor worksite preparation is employed, additional cleaning may be required to meet clearance.

C. Special Problems

Surfaces such as porous concrete, old porous hardwood floors, and areas such as corners of rooms and window troughs pose especially difficult cleaning challenges. Porous concrete and corners of rooms normally require additional vacuuming to achieve an acceptable level of cleanliness.

The lead hazard control strategy of enclosure is frequently chosen for window troughs and for old porous hardwood floors due to the difficulty of adequately cleaning these surfaces. This





option provides not only a clean surface but a more permanently cleanable surface for dwelling occupants to maintain.

VII. Alternative Methods

Alternatives to the recommended cleaning tools and practices discussed in this chapter are available, some having significant potential for increasing effectiveness and lowering costs.

A recent Canadian study (CMHC, 1992) evaluated the effectiveness of contaminated dust cleanup activities using tools that would generally be available to construction contractors and homeowners. Vinyl flooring and carpeting were cleaned using several wet/dry vacuuming systems, sweeping, and wet mopping. The study found that regular vacuums with empty bags send a steady stream of fine particles into the air, while vacuums with partially filled bags were more efficient. This finding suggests the necessity for HEPA vacuums. Other vacuums may be used if workers do not experience increased exposures, if compliance with clearance standards is achieved, and if a variance from OSHA regulation (29 CFR 1926.62 (h)(4)) is obtained by the contractor or employer (if required).

Agitator heads on vacuums were demonstrated to significantly enhance vacuum effectiveness on carpets in cleaning up fine dust without

increasing airborne dust levels. Table 14.2 suggests that a central vacuum with an agitator head is most efficient at removing dust and minimizing recontamination, probably because the vacuum exhaust is blown away from living areas. Because many houses do not have central vacuuming systems, a portable HEPA vacuum is the next best choice (see Table 14.2). Vacuums without agitator heads appeared to perform relatively poorly on carpets.

A. Vacuums

Regular (non-HEPA) dry vacuums potentially produce hazardous levels of airborne dust and therefore should be avoided. Externally exhausted vacuum units with adequate dustretaining capability may be used. The OSHA lead standard requires the use of HEPA vacuum equipment (see 29 CFR 1926.62 (h)(4), which states, "where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters").

B. Trisodium Phosphate and Other Detergents

TSP detergents have been used successfully for a number of years in lead hazard control work. However, in recent years, other new cleaning agents have been developed specifically for leaded dust removal. The need for alternatives has been fueled by the fact that TSP is an eye

Table 14.1 Initial Cleaning Wipe-Test Failure Rates for Various Abatement Strategies

Dust Test Location	Hand Scrape w/Heat Gun	Chemical Removal	Enclosure	Encapsulation	Replacement	All Methods
Floors	28.8%	22.7%	20.0%	13.8%	12.5%	19%
Sills	24.4%	24.1%	8.2%	4.8%	17.4%	14%
Wells	44.5%	45.7%	23.7%	25.7%	21.0%	33%

Source: U.S. Department of Housing and Urban Development (August 1991) The HUD Lead-Based Paint Abatement Demonstration (FHA)





and skin irritant and is increasingly restricted from household use and unavailable in many local jurisdictions. TSP also damages some finishes. Recently reported trials of two new products suggest that alternative lead-specific cleaning agents may be more effective and safer than TSP (Grawe, 1993; Wilson, 1993).

These Guidelines do not prohibit the use of non-TSP cleaning agents. HUD encourages further evaluation of alternative cleaning methods. Use of any cleaning agent that results in compliance with clearance criteria is encouraged.

Table 14.2 Mass Removal Efficiency for Extended Vacuuming Cycles

	Mass Removal Efficiency Percentages						
Cycle Number	Cleaning Method						
	Central Vacuum—Plain Tool	Central Vacuum—Agitator Head	HEPA Vacuum	Portable Vacuum—Plain Tool			
1	34.7	71.0	55.4	17.5			
2	47.0	80.2	61.2	23.0			
3	51.9	85.9	66.3	26.6			
4	56.0	87.8	67.0	29.4			
5	59.3	88.9	72.1	32.5			
6	61.6	91.2	74.4	34.9			
7	63.8	93.1	76.4	36.5			
8	67.5	95.4	77.5	38.1			
9	67.5	97.7	78.7	40.1			
10	67.2	100.0	80.2	41.7			
11		102.3	80.2	41.7			
12		104.6	84.1	44.8			
13		104.6	84.5	46.8			
14		103.8	84.5	48.4			
15				49.6			
16				50.8			
17				52.4			
18				53.6			
19				54.4			
20				55.2			

Source: Canada Mortgage and Housing Corporation: Saskatchewan Research Council (December 1992) Effectiveness of Clean-up Techniques for Leaded Paint Dust

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MDARNG Facilities IH Baseline Surveys Brig GEN William Smallwood Armory, La Plata, MD Project No. 55-ML-01ED-03

APPENDIX G

MOLD GUIDANCE

Army Facilities Management Information Document on Mold Remediation Issues

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

Moisture Control: The Army Way to Mold Prevention!

INTRODUCTION

Concern about indoor exposure to mold has been increasing as the public becomes more aware that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions.

This document provides the best and most current guidance for remediation of clean water damage (<48 hours) and mold contamination (>48 hours) into one resourceful Army guide. This guide has been designed to provide information to facilities management individuals who have little or no experience with mold remediation. It will assist them in making a reasonable judgment as to whether the situation can be handled in-house. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor. If an outside contractor is employed, they must have experience cleaning up mold. Check their references, and have them follow the recommendations presented in this document, EPA guidelines, and/or guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH). A multi-disciplinary team approach to mold concerns is best. A health and safety professional, such as an industrial hygienist, should be consulted prior to any remediation activities to assist in the project.

Molds produce tiny spores to reproduce. Mold spores float through the indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.(1)

In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur. Any initial water infiltration should be stopped and clean up began immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. (Refer to Appendix A for detailed guidance on clean water damage response). If the source of water is elevated humidity, actions to maintain the relative humidity levels below 60% to inhibit mold growth should be taken (2). Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

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MOLD PREVENTION TIPS:

[Adapted from EPA, reference 1]

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilating, and air-conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

REMEDIATION PLANNING

- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Select cleanup methods for moldy items (Appendix B)
- Select Personal Protection Equipment (PPE)- protect remediators (Appendix B)
- Select containment equipment protect building occupants (Appendix B)
- Select remediation personnel who have the experience and training needed to implement the remediation plan and use PPE and containment as appropriate

REMEDIATE MOISTURE AND MOLD PROBLEMS

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Clean and dry moldy materials (Appendix B)
- Discard moldy porous items that can't be cleaned (Appendix B)

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REMEDIATION PROCEDURES

Four levels of abatement are described below. The size of the area impacted by mold contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of mold and preventing dust contaminated with mold from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. (3)

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work. (1 and 3)

The use of bleach or other biocides is questionable in most cases (8). The effectiveness of bleach in reducing living mold is dependent on concentration, residual chlorine levels, and contact time on the surface (8). All of these factors are difficult to control during remediation. Removal of all mold growth can generally be accomplished by physical removal of materials supporting active growth and thorough cleaning of non-porous materials (4). Therefore, application of a biocide serves no purpose that could not be accomplished with a detergent or cleaning agent (4).

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."(4)

FOUR REMEDIATION LEVELS

[Adapted from NYCDOH Guidelines on Assessment and Remediation of Fungi in Indoor Environments (3) and EPA (1)]

Level I: Small Isolated Areas – Total surface area affected less than 10 square **feet** - e.g., ceiling tiles, small areas on walls. Refer to Appendix B for detailed guidance.

Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Level II: Medium – Total Surface Area affected between 10 and 100 square feet - e.g., several wallboard panels. (See Appendix B for detailed guidance).

The following procedures at a minimum are recommended:

Refer to Appendix C for proper PPE selection. Limited or Full protection may be required depending on the situation.

Refer to Appendix D for Containment procedures.

The work area and areas directly adjacent should be covered with a single layer of 6 mil fire-retardant polyethylene sheet(s) and taped before remediation, to contain dust/debris.

Seal ventilation ducts/grills in the work area and areas directly adjacent with 6 mil polyethylene sheeting. Use an exhaust fan with a High Efficiency Particulate Air (HEPA) filter to generate negative pressurization.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and surrounding areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level III be followed.

Level III: Large Area – Total Surface Area affected greater than 100 square feet or potential for increased occupant or remediator exposure during remediation is estimated to be significant. (See Appendix B for detailed guidance).

The following procedures are recommended:

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from occupied spaces using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

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The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air(4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If any remediation sampling is deemed necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

Level IV: Remediation of HVAC Systems (See Appendix B for detailed guidance. For a small area (<10 ft²) follow Level I guidance for PPE and containment and for a areas (>10 ft²) follow Medium (Level II) or when greater than 100 ft² follow Large (Level III) guidance for PPE and containment as discussed in Appendices B, C, and D)

A Small Isolated Area of Contamination (total surface area affected <10 square feet) in the HVAC System

The HVAC system should be shut down prior to any remedial activities.

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Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended (7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Areas of Contamination (Total surface area affected >10 square feet) in the HVAC System

The following procedures are recommended:

The HVAC system should be shut down prior to any remedial activities.

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from other areas. Isolate the HVAC system using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and removed in double-bagged 6-mil plastic. When a decontamination room is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

All areas should be left dry and visibly free from contamination and debris.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air (4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If remediation sampling is necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HAZARD COMMUNICATION

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When mold growth requiring Level III or IV (large-scale) remediation is found, the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners (1 and 3).

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CONCLUSION

In summary, the prompt remediation of contaminated material and infrastructure repair must be the primary response to mold contamination in buildings. The simplest and most expedient remediation that properly and safely removes mold growth from buildings should be used. Widespread contamination poses much larger problems that must be addressed on a case-by-case basis in consultation with a health and safety specialist. Effective communication with building occupants is an essential component of all remedial efforts. Individuals with persistent health problems should go to the local occupational health clinic or see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures.

REFERENCES

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- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

Water Damage Cleanup and Mold Prevention

Appendix A presents strategies to respond to water damage within 24-48 hours. These guidelines are designed to help avoid the need for remediation of mold growth by taking quick action before growth starts. If mold growth is found on the materials listed in Appendix A, refer to Appendix B for guidance on remediation. Depending on the size of the area involved and resources available, professional assistance may be needed to dry an area quickly and thoroughly.

Water Damage - Cleanup and Mold Prevention				
Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mold Growth£				
Water-Damaged Material†	Actions			
Books and papers	 For non-valuable items, discard books and papers. Photocopy valuable/important items, discard originals. Freeze (in frost-free freezer or meat locker) or freeze-dry. 			
Carpet and backing - dry within 24-48 hours§	 Remove water with water extraction vacuum. Reduce ambient humidity levels with dehumidifier. Accelerate drying process with fans. 			
Ceiling tiles	Discard and replace.			
Cellulose insulation	Discard and replace.			
Concrete or cinder block surfaces	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. 			
Fiberglass insulation	Discard and replace.			

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Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	 Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. Check to make sure under flooring is dry; dry under flooring if necessary. 		
Non-porous, hard surfaces (Plastics, metals)	Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.		
Upholstered furniture	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture. 		
Wallboard (Drywall and gypsum board)	 May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible. 		
Window drapes	Follow laundering or cleaning instructions recommended by the manufacturer.		
Wood surfaces	 Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. Wet paneling should be pried away from wall for drying 		

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£ If mold growth has occurred or materials have been wet for more than 48 hours, consult Appendix B. Even if materials are dried within 48 hours, mold growth may have occurred. Professionals may test items if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then OSHA may have requirements for Personal Protective Equipment and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

- † If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.
- § The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

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APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*						
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment Containment				
	SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)					
Books and papers	3					
Carpet and backing	1, 3					
Concrete or cinder block	1, 3					
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum				
Non-porous, hard surfaces (plastics, metals)	1, 2, 3	N-95 respirator, gloves, and goggles	None required			
Upholstered furniture & drapes	1, 3					
Wallboard (drywall and gypsum board)	3					
Wood surfaces	1, 2, 3					

MEDIUM - Total Surface Area Affected Between 10 and 100 ft ²							
Books and papers	3						
Carpet and backing	1,3,4						
Concrete or cinder block	1,3						
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area				
Non-porous, hard surfaces (plastics, metals)	1,2,3	potential for remediator exposure and size of contaminated area					
Upholstered furniture & drapes	1,3,4						
Wallboard (drywall and gypsum board)	3,4						
Wood surfaces	1,2,3						
	LARGE - Total Surface Area Affected Greater Than 100 ft ² or Potential for Increased Occupant or Remediator Exposure During Remediation Estimated to be Significant						
Books and papers	3						
Carpet and backing	1,3,4						
Concrete or cinder block	1,3	Full	Full				
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider potential for remediator/occupant exposure	Use professional judgment, consider potential for remediator exposure and				
Non-porous, hard surfaces (plastics, metals)	1,2,3	and size of contaminated area	size of contaminated area				
Upholstered furniture & drapes	1,2,4						
Wallboard (drywall and gypsum board)	3,4						
Wood surfaces	1,2,3,4						

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. Consult Appendix A if materials have been wet for less than 48 hours, and mold growth is not apparent. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

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Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

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APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

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Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

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APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above

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the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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Industrial Hygiene/ Preventive Medicine Mold Assessment Guide

TG 278 February 2002



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Industrial Hygiene/Preventive Medicine Mold Assessment Guide

Introduction

The USACHPPM Industrial Hygiene Field Services Program receives requests from industrial hygiene (IH)/preventive medicine (PM) field personnel for information about mold investigations and clean-up procedures. Like all organisms, molds have an absolute requirement for water. The types of mold and their abundance in an area depend on the availability of nutrients (i.e., dirt), water and temperature. Chronic water intrusion, lack of adequate ventilation and moisture control, and or isolated floods, such as a water pipe bursting, are typical conditions, which lead to mold growth in buildings.

When mold growth is present, the removal and cleaning of contaminated materials must be handled with proper precautions, because disturbing this growth can result in bioaerosol release, i.e., sending millions of spores into the air.

This mold assessment guide used in conjunction with the *ARMY Facilities Management Information Document on Mold Remediation Issues* (*TG 277*)¹ will assist Industrial Hygienists and or Preventive Medicine personnel in conducting mold investigations. Since a team approach is recommended, the collaboration between IH/PM personnel and facility management personnel is vital to correct moldy conditions and prevent future mold growth. Use the following procedures and refer to Appendix A: Mold Investigation Decision Logic, for guidance on mold investigation, evaluation, and remediation for routine assessments.

Air sampling for mold should never be part of a routine assessment. Remediation strategies can generally be made on the basis of a visual inspection or confirmation with a bulk or surface sample. In addition, air sampling methods for some mold are prone to false negative results and therefore cannot be used to definitively rule out contamination².

Safety Tips While Investigating and Evaluating Mold and Moisture Problems³

- Be careful not to touch mold or moldy items with bare hands.
- Do not allow mold or mold spores to get into your eyes.
- Do not breathe in mold or mold spores.
- Consult **Appendices B, C, and D** for Remediation, Personal Protective Equipment (PPE) to be used during remediation and Containment guidance.
- Consider using PPE when disturbing mold during investigation. Depending upon the situation, a half-face NIOSH-approved N-95 respirator, gloves, and goggles are recommended.

Communicate with building occupants at all stages of process, as appropriate¹.

When mold growth requiring Level III or IV (large-scale) remediation is found (See Appendix B), the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

Routine Investigation and Evaluation of moisture and mold problems³.

- Determine the total surface area of visible mold affected (square feet).
- Consider the possibility of hidden mold.
- Clean up small mold problems and fix moisture problems before they become large problems.
- Select remediation personnel or team based on the assessment.
- Investigate areas associated with occupant complaints.
- Identify source(s) or cause of water or moisture problem(s).
- Note type of water-damaged materials (wallboard, carpet, etc.).
- Check inside air ducts and air handling unit.

Assessments Requiring Sampling

Air sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician/medical practitioner desires to confirm the causative agent.

Pre- and post-remediation air sampling may be necessary if there is evidence from a visual inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination².

When air sampling is deemed necessary and is performed, outdoor air samples should be collected at the same time at the fresh air intake, which serves the suspected area. Values obtained should be compared and the indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air⁴. If they are different, bioamplification is occurring and the problem needs corrected.

Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', "Bioaerosols: Assessment and Control⁴."

Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program. For further mold assistance, contact USACHPPM, Industrial Hygiene Field Services Program, DSN 584-3118 or (410) 436-3118.

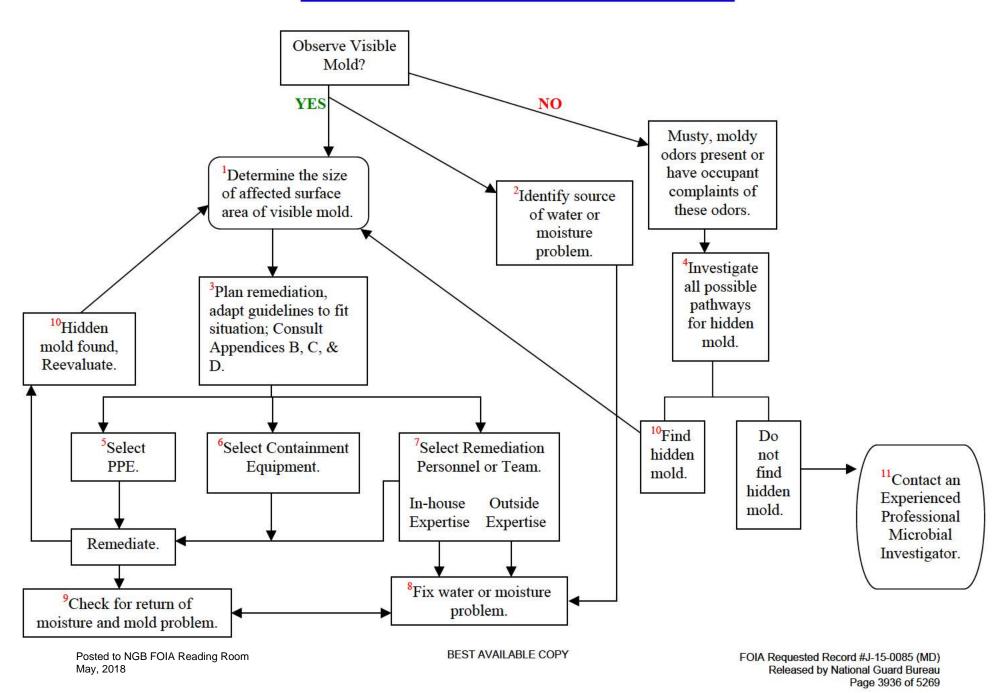
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- 3. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 4. American Conference of Governmental Industrial Hygienists (ACGIH): *Bioaerosols: Assessment and Control*, edited by Janet Macher. Cincinnati, OH: ACGIH, 1999.
- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
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- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

MOLD INVESTIGATION DECISION LOGIC

MOLD INVESTIGATION DECISION LOGIC



MOLD INVESTIGATION DECISION LOGIC NOTES:

- 1. Roughly approximate the total surface area of visible mold. Categorization of the remediation levels are sometimes borderline, so when trying to decide the category to apply, consider the extent of visible growth, such as a heavy blanket of growth on the surface, to barely visible. If heavy growth is apparent, consider moving up to the next level of protection.
- 2. Do not skip this step. Address the source of water or moisture problem or the mold will simply reappear.
- 3. Always protect the health and safety of the building occupants and remediators.
- 4. Mold may be hiding on the backside of drywall, vinyl wallpaper, or paneling, the top of ceiling tiles, the underside of carpets and pads. Check walls behind furniture, pipe chases and utility tunnels, porous thermal or acoustic liners inside ductwork, or check the rafters (due to roof leaks or insufficient insulation)³.
- 5. Utilize appendices B and C for remediation guidance. Use your best judgment during investigations, if not disturbing the mold you may need minimal to no PPE. Do not alarm building occupants unnecessarily, but protect yourself as necessary.
- 6. If the containment is working properly, the polyethylene sheeting will billow inwards on all surfaces. If it flutters or billows outward, containment has not been achieved, and you should find and correct the problem before starting your remediation activities³. Confirm negative pressure with smoke tubes.
- 7. Select remediation personnel who have the experience and training needed to implement the remediation plan.
- 8. You must completely fix or eliminate the water or moisture problem to solve the problem.
- 9. You should revisit the site(s) approximately two weeks after remediation, and it should show no signs of water damage or mold growth.
- 10. If you discover hidden mold, revise your plan by reassessing the size of moldy area.
- 11. If you believe that you have a hidden mold problem, you may want to consider hiring an experienced mold investigative professional.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Material or Furnishing Cleanup Affected Methods†		Personal Protective Equipment	Containment			
SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)						
Books and papers	3					
Carpet and backing	1, 3					
Concrete or cinder block	1, 3					
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum				
Non-porous, hard surfaces (plastics, metals)	1, 2, 3	N-95 respirator, gloves, and goggles	None required			
Upholstered furniture & drapes	1, 3					
Wallboard (drywall and gypsum board)	3					
Wood surfaces	1, 2, 3					
	MEDIUM - T	otal Surface Area Affected Between 10 and	1 100 ft ²			
Books and papers	3					
Carpet and backing	1,3,4					
Concrete or cinder block	1,3	_				
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider	Limited Use professional judgment, conside			
Non-porous, hard surfaces (plastics, metals)	1,2,3	potential for remediator exposure and size of contaminated area	potential for remediator/occupant exposure and size of contaminated a			
Upholstered furniture & drapes	1,3,4					
Wallboard (drywall and gypsum board)	3,4					
Wood surfaces	1,2,3					
		face Area Affected Greater Than 100 ft ² or diator Exposure During Remediation Esti				
Books and papers	3					
Carpet and backing	1,3,4					
Concrete or cinder block	1,3	Full	Full			
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider potential for remediator/occupant exposure	Use professional judgment, consider potential for remediator exposure and s			
Non-porous, hard surfaces (plastics, metals)	1,2,3	and size of contaminated area	of contaminated area			
Upholstered furniture & drapes	1,2,4					
Wallboard (drywall and gypsum board)	3,4					
		7				

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber.
 Maintain area under negative pressure with HEPA filtered fan exhausted outside of building.
 Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

®TYVEK, DuPont de Nemours, E.I., & Co., Wilmington, DE.

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to

minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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Industrial Hygiene Survey

National Guard Facility LaPlata Armory

Prepared For:

National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location:

LaPlata Armory

14 West Hawthorne Drive

LaPlata, MD 20646

Prepared By:

Analytical Laboratory Services, Inc.

3544 North Progress Avenue

Suite 100

Harrisburg, PA 17110

Survey Date:

September 15, 2010

Report Date:

October 7, 2010

ALSI Project #:

1009596

Non-Responsive

Director, Environmental Health & Safety

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on September 15, 2010, at the LaPlata Armory located at 14 West Hawthorne Drive, LaPlata, MD 20646. The survey was performed by Ms Non-Responsive and Mr Non-Responsive

- 1. Lead surface, air and bulk samples were collected. All sample results were less than recommended guidelines or regulatory standards.
- 2. Lighting levels met the minimum recommended guidelines in all locations evaluated.
- 3. Indoor air quality parameters of temperature, relative humidity carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment. Temperature was higher than the recommended criteria of 79 degrees F in most tested locations. There is no central air-conditioning system in this facility.
- 4. Some areas of suspected asbestos containing floor tile are damaged. Damaged floor tile and mastic should be properly abated and repaired. Vinyl floors should be regularly waxed.
- 5. Water damaged ceilings and active roof leaks are present. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced. Areas such as ceilings and walls with water damage should be repaired. On the exterior of the building there are cracks in the concrete and mortar is missing. This provides a pathway for water infiltration to occur. These areas should be repaired. In the Boiler Room there is rusting and water damage on the ceiling. This is reported to be caused by condensation. This area should be investigated for potential solutions to the condensation and water infiltration problem.

Section 2.0 Operation Description & Observations

The LaPlata Armory is mainly an administrative facility with offices, training and storage areas. There were approximately 4 full-time employees stationed at this facility at the time of this survey.

The building was initially constructed in 1954. The exterior is brick. The interior walls are primarily concrete block and drywall. The floors are wood and concrete with some vinyl floor tile.

There is no central heating, ventilating, and air conditioning system (HVAC) present. Outdoor air ventilation occurs via open doors and windows. Doors and windows were open on the day of this survey. Heat is provided via a boiler-fired heating system.

There is an old firing range in the building. It was closed in the 1970's and has been fully abated. It is now a classroom. There is no child-care facility in the building.

Overall housekeeping was good. Areas were clean and well kept.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. Personnel had supportive chairs.

Section 3.0 Noise Survey

Employees were not performing tasks that provided excessive noise levels. Therefore, noise exposure monitoring was not conducted.

Section 4.0 Lead Testing

At the time of the assessment, no activities were observed which would generate lead exposure. The facility contains an office area which was once an indoor firing range.

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham. Maryland, for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

. Sample#	Location	Air ug/m³	Surface ug/ft ²	Paint Chip
1	Drilt Hall	<4.3	· · · · · · · · · · · · · · · · · · ·	•
2	RNCO Office	<4.1		
	Blank	<3 (ug)		
4	Entry Lobby - Floor		<110	
5	Room (07 Lounge Tabletop		<110	
6	Drill Hall - Floor (Center)	·	<110	
7	Drill Hall - Tabletop	<u>-</u>	<110	
8	Drill Hall Ceramic Tile Ledge on Wall		130	•
9	Room 120 Window Sill		<110	
10	Room 116 RNCO Office Radiator Grill		<110	
	Converted Firing Range - Floor		<110	•
12	Converted Firing Range Window Sill	· · · · · · · · - · - · · ·	<110	
13	Converted Firing Range Top of Older Locker	i	<110	
14	Floor Outside Converted Firing Range		<110	
15	Attached Garage - Floor	<u> </u>	<110	1
16	Gym Window Sill		<:10	1
17	Locker Room 201 - Floor		<110	
18	Blank		<12 (ug)	
. 19	RNCO Office - Wall	;- · -]	0.16
Criteria		50	200	0.5

Key: Bolded results exceed listed criteria

Lead surface, air and bulk samples were collected. All sample results were less than recommended guidelines or regulatory standards.

The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. In the "Derivation of Wipe Surface Screening Levels for

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Environmental Chemicals." the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³. In fact, no detectable level of lead was identified in the air samples collected.

Deteriorated paint was observed in a many locations throughout the facility. Detarminated paint was mostly due to water leaks and age along with prolonged exposure to clevated relative humidity levels. A paint chip sample was collected from peeling paint in the Drill Hall. This paint was found to be 0.16% lead. This is below the HUD definition of lead-based paint (0.5%).

Section 5.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke CaJ-Light 4001. Precision Light Meter (Serial No. K070003). The light meter was last calibrated on November 26, 2009. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location .	Foot Candles	Recommended Lighting	Sufficient Lighting
Room 107 Lounge	112.5	30-50	Yes
Kitchen	73.4	50	Yes
Attached Garage	90.9	75	Yes
Classroom - Converted Firing			
Range	71.4	30-50	Yes :
Drill Hall	44.1	30-50	Yes
Room 120	110.6	30-50	Yes
Room 118	61.6	30-50	Yes
Room 116 RNCO Office	153.3	30-50	Yes
Room 207 Gym	44.4	30	Yes
Locker Room 201	56.6	5	Yes
Entry Lobby	144.2	5	Yes

Lighting levels met the minimum recommended guidelines in all locations evaluated.

Section 6.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7565X (Serial # 0839020). The IAQ Meter was last calibrated in March 2010.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior of the structure ranged from 78.1 to 82.6 degrees F with relative humidity readings ranging from 34.4% to 41.8%. During the survey, carbon dioxide (CO₂) levels ranged from 363 ppm to 588 ppm within the facility compared to an outdoor CO₂ level of 382 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO₂ recommended is 1.082 ppm (382 ppm ± 700 ppm). Carbon monoxide (CO) ranged from 0.1 = 0.6 ppm.

The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Outdoors	86.9	30.3	382	0.5
Room 107 Lounge	81.1	34.4	382	0.6
Kitchen	80.4	36.4	378	0.5
Attached Garage	80,1	37.8	385	0.6
Classroom - Converted Firing Range	78.1	38.0	375	0.4
Drill Hall	82.6	35.7	363	0.1
Room 120	80.8	41.8	431	0.7
Room 118	80.6	38.5	413	0.3
Room 116 RNCO Office	81.0	39.0	588	0.2
Room 207 Gym	89,4	37.5	449	0.2
Locker Room 201	79.9	37.2	400	0.3
Entry Lobby	80.1	37.6	383	0.3
Criteria	73,0-79.0	30-60	<1.082	<9.0

Key: Bolded results exceed listed criteria

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Temperature was higher than the recommended criteria of 79 degrees F in all but one indoor location sampled. There is no central air conditioning system present. Windows and doors were open. There were a few window units or portable air-conditioners in use. Outdoor conditions were hot with moderate relative humidity. Relative humidity indoors was within the recommended guideline of 30-60%.

Carbon dioxide levels did not exceed the recommended ceiling of 1,082 ppm. This suggests that outdoor air ventilation is adequate in this area. There is no mechanical ventilation system in this facility. Outdoor air ventilation occurs through open doors and windows.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- 1. Water damaged ceilings and active roof leaks are present. All sources of water infiltration should be identified and repaired. Water damaged ceiling tile should be removed and replaced.
- 2. Roof leaks or water damage was observed in:
 - o Room 21;
 - o RNCO Office:
 - o Converted Firing Range (Classroom)
- 3. On the exterior of the building there are cracks in the concrete and mortar is missing. This provides a pathway for water infiltration to occur. These areas should be repaired.
- 4. In the Boiler Room there is rusting and water damage on the ceiling. This is reported to be caused by condensation. This area should be investigated for potential solutions to the condensation and water infiltration problem.

Section 7.0 Suspect Asbestos Containing Building Materials

Suspect asbestos containing materials (ACM) include sheetrock/joint compound, plaster wall and ceiling systems, floor tiles and associated mastic, and vinyl cove base. Thermal system insulation which is most likely a combination of paper wrapped fiberglass with PVC elbows and well as pre-formed TSI with mudded elbows was suspected. No samples were collected. Inaccessible areas were not inspected.

The following are the most notable findings regarding suspect ACM at the time of this survey:

- 1. 9" x 9" black and green floor tile and mastic are present in the facility. Approximately 5,000 ft² was observed. Floor tile in the locker room is in poor condition and should be abated or repaired. Floor tile should be regularly waxed and a proper coating of wax should be maintained on the surface of the tile.
- 2. Suspected asbestos containing pipe insulation was observed in the bathrooms. This was in good condition.

Section 8.0 Maintenance Bay

There is a garage area at this facility. It was previously used for vehicle maintenance but is now used only for parking. Overhead vehicle exhausts are present but have been disconnected and are no longer used. There is a storage area that was previously used as a battery storage room. It is no longer used for battery storage.

The battery room has one exhaust fan located on the wall inside the room. The air ventilates directly outside. The battery storage room has a floor space of 108 ft². According to Unified Federal Code 3-410-01FA (UFC) regulations, the battery room should have 1.5 CFM per square of floor space or 162 CFM if it is used for battery storage. Based upon the data gathered, the ventilation rate inside the battery room was a total of 374 CFM. This is above the recommended value for a battery storage room. Ventilation is adequate should this area be used as a battery storage room.

The overhead vehicle exhaust should be repaired and utilized if vehicle maintenance activity occurs that involves operation of vehicles inside the building.

Section 9.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be reflect upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Analytical Laboratory Services, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report



AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

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1080530	1009596-1	Fanc	Alt	704	N/A	4.3	ug/m²	8	K.	ug/m³	The state of the s
1080631	1009596-2	Flame	Air	733	N/A	*	ug/m³	\$	<4.1	ug/m³	
1080632	1009596-3	Flame	Air Dlank	.0	V/N	m	ug/m³		Ø	iii iii	
1080633	1009596-19	Flance	Palm Chip	黄金黄	N/A	0.011	%Pb		0.16	%Pb	
1080634	1009596-4	Plante	Wipe	****	0.108	110	ng/ft?	<12	OH 12	11E/B1	
1080635	1009596-5	Pigne	Wipe	***	0.108	110	ug/ft-	<12	01J>	ug/H²	
1080636	1009596-6	Flame	Wipe	***	0.108	110	ug/ft*	<12	<110	ug/ff²	
1080637	1009596-7	Flame	Wpc	***	0.108	110	-U/Sn	\$15	0170	ug/fitz	
1080638	1009596-8	Flame	Wipe	***	0,108	110	ug/#²	14	130	ug/H²	
1080639	1,009596-9	Flame	Wipe	***	0.108	110	ug/ft*	<12	□ 110	ug/fi²	
1080640	1009596-10	Flane	Wipe	***	0,108	110	ng/ff?	412	₹110	ng/Az	
1080641	10:09596-11	Flame	Wipe	各种特殊	0.168	110	ug/ft²	<12		ug/ft²	
1080642	1009596-12	Flame	Wipe	· ************************************	6.108	110	ug/ft*	<12	O()>	11g/ff ²	
1080543	1009596-13	Flame	Wite	等华班安	0.108	110	ug/fi	<12	410	ug/A²	
1089644	1009596-14	Flame	Mybe	安安安安	0.108	110	ug/ff?	<12	<110	ng/ff²	
1080645	1009596-15	Flanc	Wipe	****	0.108	011	ug/ff?	<13	01.10 ✓1.10	ng/ft²	
1030646	1069596-16	Flame	With	****	0.108	110	ug/ft²	<12	Of 10	ng/ff²	
1080647	10:09:596-17	Flams	Wipe	***	0,108	110	uB/Gu	<12	410	ug/III	
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Summary of Atomic Absorption Analysis for Lead

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Reporting Limit

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Analysis Method For Furnace: Alt, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water, SM-3113B Analysis Method for Flame: Air, Wipes, Paints, and Soli/Solids; EPA 600/R-93/200(M)-7420; Water: SM-3111B:

mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm) ugit. = parts per billion (ppb) ug = micrograms %Pb = percent lead on a dry weight basis N/A = Not Applicable

Note: All samples were received in good condition unless otherwise noted Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

See QC Summary for analytical results of quality control samples NY ELAP accreditation applies only to paint chip, wips, and soil associated with these sampes, sambles.

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Lechnical Manager:

G Edward Carney

An AIRA (F100470), NVIAP (101143-9), and NV ILAF (F10920) Agreedited Laboratory

submitted and acceptance use of the client to whom it is addressed and upon the condition that it is not to be used in whole or in part, in any advertising or publish matter without prior written autumization from us. Sample types, lessinging are based upon the information provided by the persons submitting them and, unless collected by its reasons condition and, unless collected by its constructions. The accuracy and completeness of

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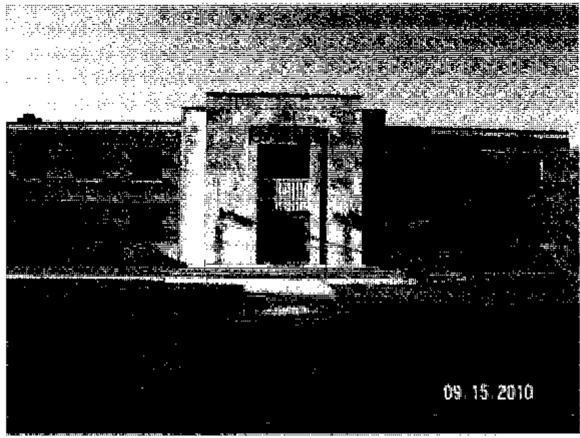
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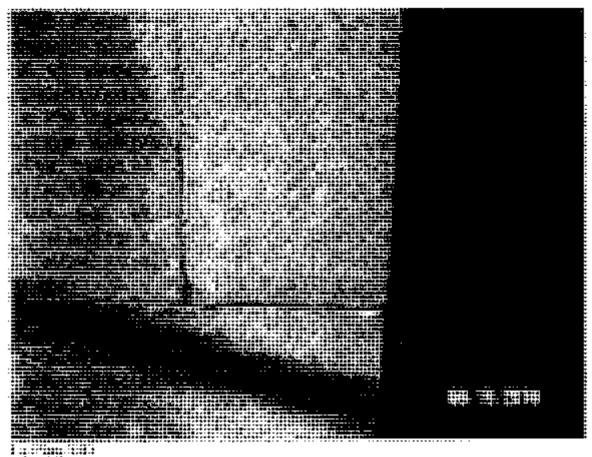
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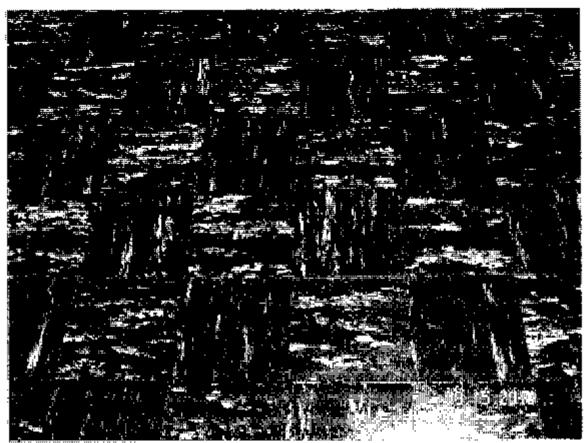
Appendix B. Photographs



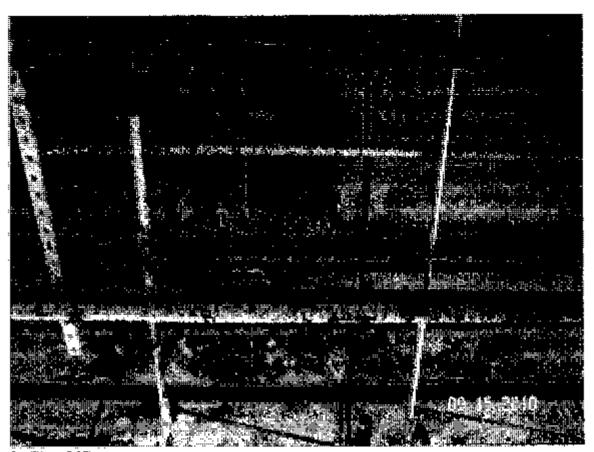
La Plata MD Exterior



Exterior Front of Building - Cracks and Damage to Mortar on Concrete

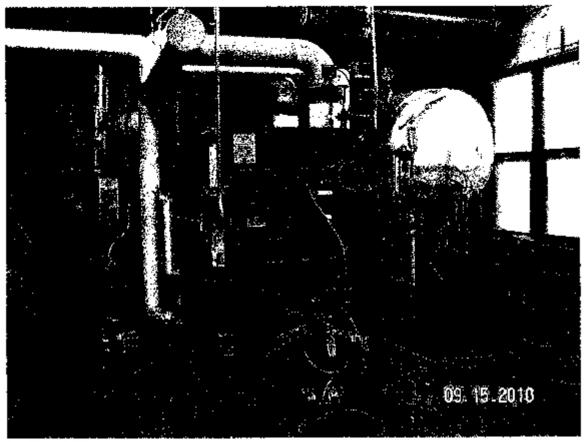


La Plata MD Lounge – 9x9 Vinyl Floor Tile (Black and Green)

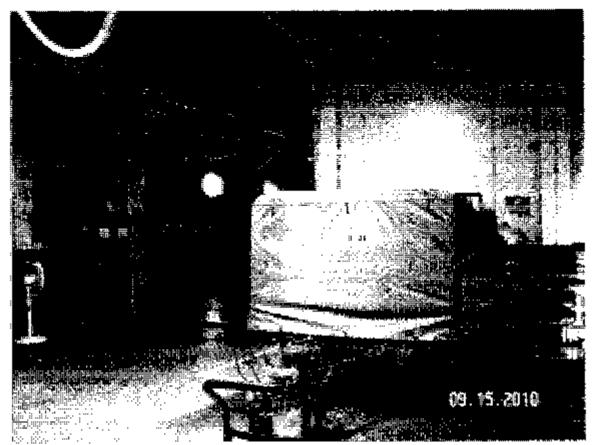


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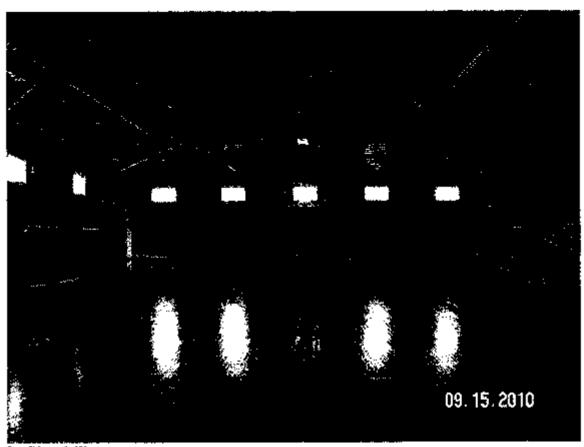
Boiler Room Ceiling Chipping and Peeling Paint and Rust on Pipes from Condensation from Boiler



La Plata MD Boiler



La Plata MD Attached Garage



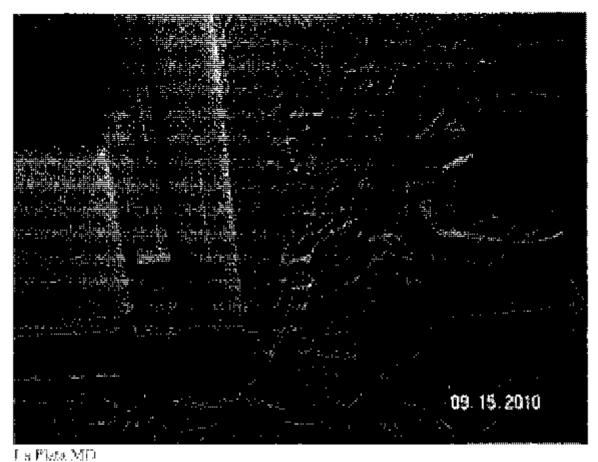
La Plata MD Drill Hall



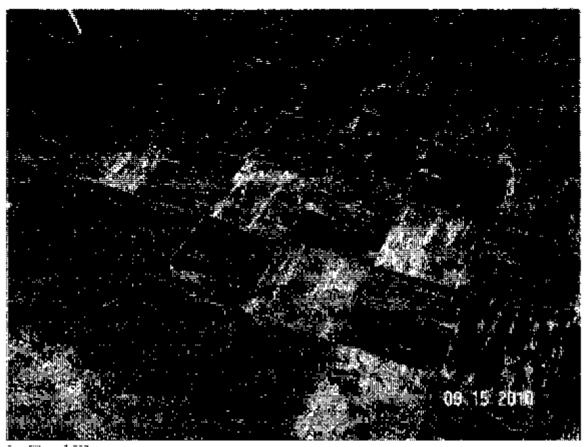
La Plata MD Room 120 Water Damage and Chipping/Peeling Paint on Ceiling



Command Office - Hole in Ceiling from Roof Leak

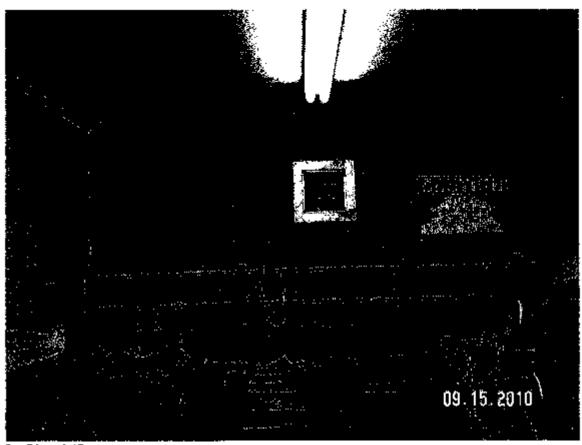


RNCO Office Significant Water Damage and Chipping/Peeling Paint on Wall

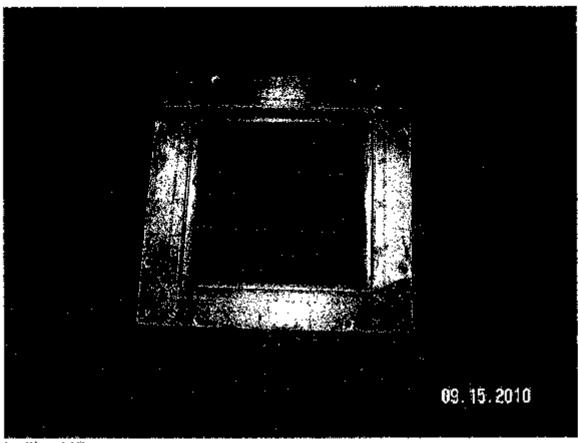


List Flate Mill

2rd Floor Room 201 Damaged 9x9 Vinyl Floor Tile and Exposed Mastic from Ongoing Water Infiltration

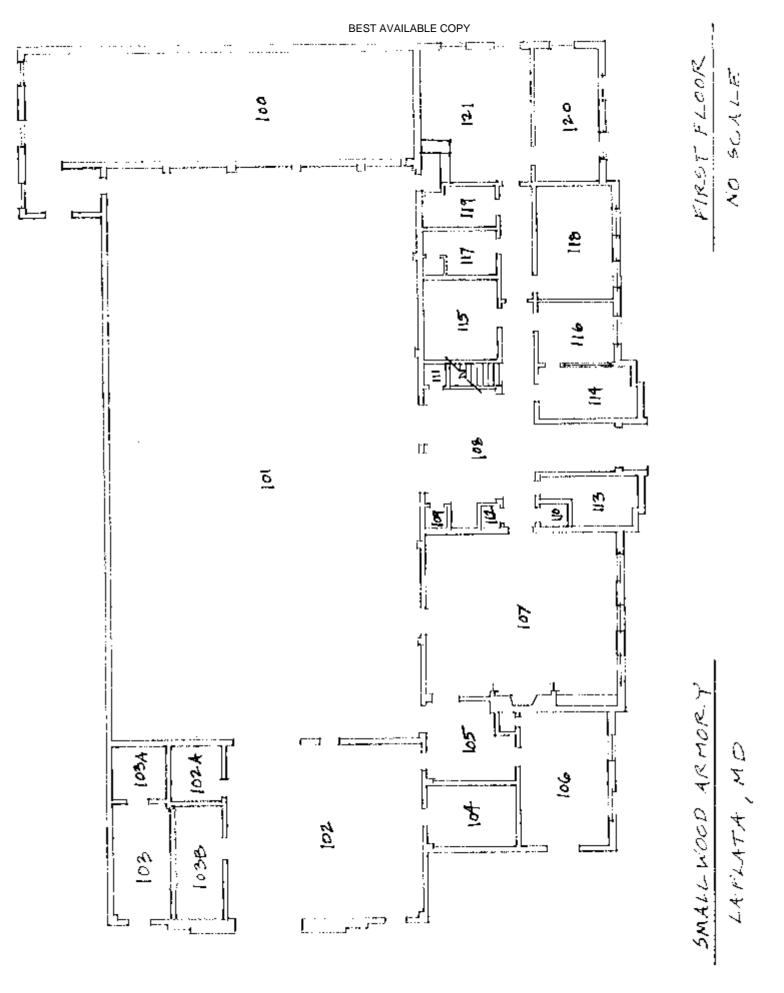


La Plata MD Battery Room (Not in Use)

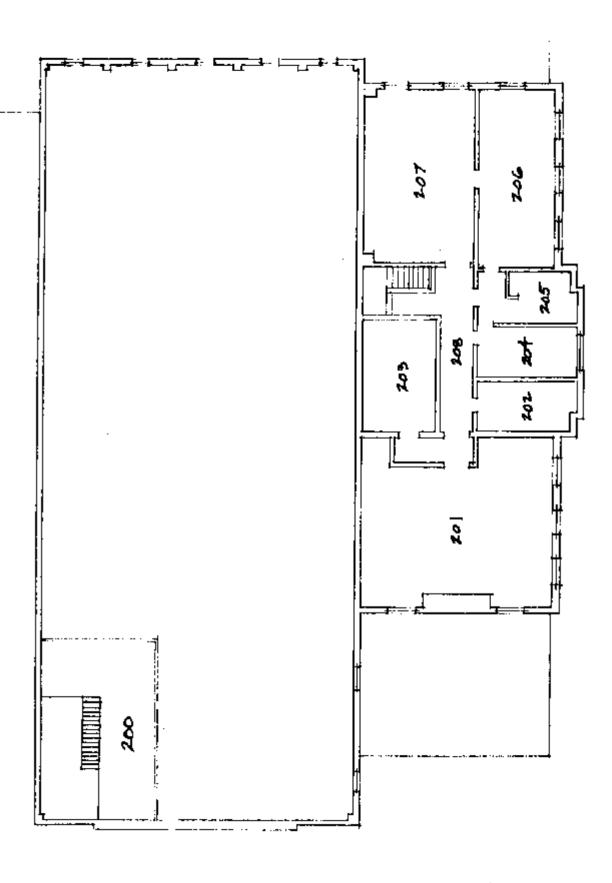


La Plata MD Battery Room – Exhaust Fan

Appendix C. Floor Plan



SMATI WOOD ARMORY



Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices, 2010 Edition
- Industrial Ventilation: A Manual of Recommended Practice for Design, 27th Edition
- 4. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ventilation for Acceptable Indoor Air Quality, 62.1-2007
- 5. RP-1-2004. Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227(h)(3)]
- 9. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)
- The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation



1215 Manor Drive, Suite 205 Mechanicsburg, PA 17055 Phone: 717.590.7031 Fax: 717.590.7936 www.complianceplace.com

Industrial Hygiene Survey Report

National Guard Facility La Plata Readiness Center

Prepared For: National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location: La Plata Readiness Center

14 W. Hawthorne Drive La Plata, MD 20646

Prepared By: Compliance Management International, Inc.

1215 Manor Drive

Suite 205

Mechanicsburg, PA 17055

Survey Date: October 3, 2013

Report Date: November 20, 2013



Non-Responsive, CIH

Manager, Industrial Hygiene Services

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Section 1.0 Executive Summary

An industrial hygiene survey was conducted on October 3, 2013, at the La Plata Readiness Center located at 14 W. Hawthorne Drive, La Plata, MD 20646. The survey was performed by Mr. Don Hartman.

- 1. Lead surface and air samples were below the recommended limits. See Section 3.0 for detailed sampling results.
- 2. Lighting levels met the American National Standards Institute/Illuminating Engineering Society of North America (ANSI/IESNA) recommended guideline in all of the locations measured. See Section 4.0 for detailed findings.
- 3. Indoor air quality (IAQ) parameters of temperature, relative humidity, carbon monoxide and carbon dioxide (ventilation) were evaluated during the assessment.
 - a. Temperature levels met the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 55-2013 recommended guideline of 68-79 °F in areas sampled.
 - b. The relative humidity levels met the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) TG 277 recommended guideline of 30-60% in the areas tested.
 - c. Carbon monoxide (CO) levels were less than the National Ambient Air Quality Standard (NAAQS) recommended ceiling of 9 parts per million (ppm).
 - d. Carbon dioxide (CO₂) levels met the ASHRAE 62.1-2013 recommended guidelines for mechanically ventilated office buildings and commercial settings.

See Section 5.0 for detailed sampling results.

4. It was reported that the building has several roof leaks. Water damaged ceiling and walls were observed in the Lobby and 1st Floor Supply Room.

Section 2.0 Operation Description & Observations

The La Plata Readiness Center is mainly an administrative facility with a drill hall, offices, and classrooms. There were four (4) full-time employees stationed at the facility at the time of this survey. There is one (1) maintenance person assigned to the building.

The building is reported to have been built in 1954. It is a two story structure. The exterior is brick and concrete. The interior walls are block and concrete. The floors are concrete, 12"x12" floor tiles, 9" x 9" floor tiles, and ceramic tile.

The heating system is an oil-fired hot water unit. Air conditioning in the facility is supplied by window units.

There is no child-care facility in the building.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared to be properly designed. Personnel had supportive chairs.

This facility contains a converted firing range being used as a storage area and gym.

Suspect asbestos containing material (ACM) was observed at the time of this survey.

Housekeeping is adequate.

It was reported that the building has several roof leaks.

Water damaged ceiling and walls were observed in the Lobby and 1st Floor Supply Room.

Section 3.0 Lead Testing

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected in accordance with the American Society for Testing and Materials (ASTM) E 1792 protocols. Air samples were collected using 0.8 micrometer (um) mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using Environmental Protection Agency (EPA) Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Air ug/m ³	Surface ug/ft ²
1	Assembly Hall	<6	*
2	Office 253	<6.3	*
3	Blank	<3	*
4	Blank	*	<12
5	Assembly Hall – Floor	*	<110
6	Assembly Hall – Top of Locker	*	<110
7	Lobby – Display Monitor	*	<110
8	Converted Firing Range – Floor Outside Entrance	*	<110
9	Converted Firing Range – Floor Inside Entrance	*	<110
10	Converted Firing Range – Top of Locker	*	<110
11	Converted Firing Range – TV Gym End	*	<110
12	Converted Firing Range – Floor Bullet Trap End	*	<110
13	Office 253 – Window Sill	*	<110
14	Copy Office – Top of Cabinet	*	<110
15	Lounge – Top of Refrigerator	*	<110
16	Kitchen – Top of Freezer	*	<110
17	Maintenance Office – Top of A/C	*	<110
18	2 nd Floor Gym – Window Sill	*	<110
19	2 nd Floor Locker Room – Top of Locker	*	<110
20	2 nd Floor Library – Top of Bookshelf	*	<110
_	Criteria	50	200

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. $ug/ft^2 = micrograms per square foot$
- 4. $ug/m^3 = micrograms per cubic meter$
- 5. **ug** = micrograms

Sources:

- 1. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges
- 2. OSHA 29CFR1910.1025 Lead Standard

The National Guard Bureau currently utilizes 200 micrograms per square foot (ug/ft²) as a benchmark for identifying lead-contaminated surfaces. This guideline is referenced in NG PAM 420-15 "Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges" as a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on window sills should be observed. There is no child care provided at this facility.

Lead surface and air samples were collected. The following is a summary of the sample results from this survey.

- Surface levels of lead met the recommended guideline of <200 ug/ft² in all locations sampled.
- Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 micrograms per cubic meter (ug/m³).

Section 4.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400 Precision Light Meter (Serial No. 98011EL). The light meter was last calibrated in November 2012. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended	Sufficient	
and E1 C	(FC)	Lighting (FC)	Lighting	
2 nd Floor Gym	37.1	30	Yes	
Locker Room	52.1	7	Yes	
2 nd Floor Men's Latrine	33.9	5	Yes	
2 nd Floor Corridor	8.5	5	Yes	
2 nd Floor Locker Room	50.3	7	Yes	
2 nd Floor Library	42.8	30-50	Yes	
Command/Staff Locker Room	59.1	7	Yes	
Supply Room-Bulk	46.1	10	Yes	
Copy Room	114.3	10	Yes	
Office 253	42.7	30-50	Yes	
Lobby	46.9	10	Yes	
Main Corridor	35.5	5	Yes	
Office CMDR A	59.1	30-50	Yes	
Office CMDR B	59.8	30-50	Yes	
Lounge	17.9	10	Yes	
Kitchen-Food Prep	77.3	50	Yes	
Office Armory	60.3	30-50	Yes	
Supply Room-Bulk	27.1	10	Yes	
Gym	44.3	30	Yes	
Assembly Hall	35.2	10	Yes	
Boiler Room	49.1	30	Yes	

Table Notes:

- 1. FC = Foot Candles
- 2. **Bolded** results did not meet listed criteria

Source: ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

The lighting levels met the minimum recommended guideline in all areas measured.

Section 5.0 Indoor Air Quality

Survey measurements were made for comfort parameters and ventilation (temperature, relative humidity, carbon dioxide, and carbon monoxide). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7575-X (Serial #39018). The IAQ Meter was last calibrated in March 2013.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2013). ASHRAE specifies temperature ranges for human comfort (ASHRAE 55-2010). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60%.

The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Outdoors	75.5	65.8	372	0.3
2 nd Floor Gym	75.2	57.7	560	0.2
Office 253	75.8	59.4	536	0.6
Criteria	68-79	30-60	<1,072	<9

Table Notes:

- 1. **Bolded** results exceed listed criteria
- 2. **ppm** = parts per million
- 3. (%) = percent relative humidity
- 4. ${}^{\circ}\mathbf{F} = \text{degrees Fahrenheit}$

Sources: The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) 55-2010, 62.1-2013, Environmental Protection Agency (EPA) National Ambient Air Quality Standard (NAAQS) & The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation.

Summary of findings and recommendations:

- Temperature measurements met the recommended 68-79°F in all occupied areas.
- Relative humidity levels met the recommended guideline of 30 60 % in all locations measured.
- Carbon dioxide levels were measured to evaluate building ventilation or the introduction or outdoor air into the building. The recommended ceiling is obtained by adding 700 ppm to the measured outdoor carbon dioxide level. For this survey, carbon dioxide levels did not exceed the recommended ceiling of

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1,072 ppm (700 ppm + 372 ppm). This is an indication that outdoor air ventilation is adequate.

- Carbon monoxide levels measured were less than the recommended ceiling of 9 ppm. The recommended ceiling of 9 ppm referenced in the above table is the National Ambient Air Quality Standard for carbon monoxide
- A visual inspection was conducted throughout accessible portions of the facility to assess sources or pathways of factors potentially deleterious to IAQ. The following observation were noted:
 - 1. Water-damaged ceiling was observed in the Lobby. Water damaged walls and window frame were observed in the 1st Floor Supply Room. Sources should be identified and corrected to ensure no further damage occurs.
 - 2. It was reported that the roof leaks in several places. Sources should be identified and corrected to ensure no further damage occurs.

Section 6.0 Suspect Asbestos Containing Building Materials (ACM)

Suspect asbestos containing floor tile was noted at the time of this survey. The floor tile is found throughout the 2nd floor and in the Main Corridor and Supply Room of the 1st Floor. In the 1st Supply Room and the 2nd Floor Locker Room, tiles in several areas were loose or missing. The tiles were in good condition and intact, therefore not sampled.

Inaccessible areas such as behind walls or crawlspaces were not inspected. ACM could potentially be present in these areas.

Section 7.0 Equipment

The following equipment was utilized during this survey. All sampling equipment was properly calibrated prior to use and verified for accuracy as applicable. See daily reports and calibrations logs for detailed information.

Equipment	Serial #	Calibration Date	Value
TSI QTrak IAQ Meter	39018	3/2013	NA
Cal Light 400 Light Meter	98011EL	11/2012	NA
SKC Air Sampling Pump	647631	10/03/13	2.79 LPM
SKC Air Sampling Pump	647610	10/03/13	2.64 LPM

Section 8.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Compliance Management International, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A. Laboratory Analysis Report



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAB #100470

Client:

National Guard Bureau

Job Name:

ARNG 4a MD

Chain Of Custody:

516880

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

La Plata

Date Submitted:

State Military Reservation

10/7/2013

Havre de Grace, Maryland 21078

Job Number: P.O. Number: Not Provided

W912K6-09-A-0003

Person Submitting:

Date Analyzed:

10/25/2013

10/28/2013

Report Date:

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 1 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Reporting Limit		Total ug	Final Res	sult	Comments
14001536	1	Flame	Air	502	N/A	6	ug/m³	<3	<6	ug/m³	
14001537	2	Flame	Air	475	N/A	6.3	ug/m³	<3	<6.3	ug/m³	
14001538	3	Flame	Air Blank	0	N/A	3	ug/m³		<3	ug	
14001539	4	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	
14001540	5	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001541	6	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001542	7	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001543	8	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001544	9	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001545	10	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001546	11	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/fl²	
14001547	12	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001548	13	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001549	14	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001550	15	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001551	16	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001552	17	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001553	18	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	
14001554	19	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110	ug/ft²	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AIHA, or any agency of the Federal Government. All rights reserved. AMA Analytical Services, Inc.

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AMA Analytical Services, Inc.



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



LAS#100470

Client:

National Guard Bureau

Job Name:

ARNG 4a MD

Chain Of Custody:

516880

Address:

301-IH Old Bay Lane, Attn: ARNG-CJG-P,

Job Location:

La Plata

Date Submitted:

10/7/2013

State Military Reservation

Havre de Grace, Maryland 21078

Job Number:

P.O. Number:

Not Provided

W912K6-09-A-0003

Person Submitting: Date Analyzed:

10/25/2013

Report Date:

10/28/2013

Attention:

Summary of Atomic Absorption Analysis for Lead

Page 2 of 2

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type			oorting Limit	Total ug	Final Result	Comments	
14001555	20	Flame	Wipe	****	0.108	110	ug/ft²	<12	<110 ug/ft²	
	or Flame: Air, Wipes, or Furnace: Air, Wipe							Summary for an	alytical results of quality co	ontrol samples
V/A = Not Applicat		ts per million (ppm					samples			
%Pb = percent lea	d on a dry weight bas	2. 2551		= parts per billion	5)					

Note: All samples were received in good condition unless otherwise noted.

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Air and Wipe results are not corrected for any blank results Final results for air and wipe samples are based on client supplied information nor verified by this laboratory.

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy.

Analyst: Nida McGarvey

Technical Manager:

G Edward Carney

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AlHA, or any agency of the Federal Government. All rights reserved, AMA Analytical Services, Inc.

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AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

Page 3997 of 5269

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OWI (410) 247-2024

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Page 3998 of 5269

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CHAIN OF CUSTODY

(Please Refer To This Number For Inquires)

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Appendix B. Photographs

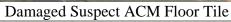


La Plata RC



Converted Firing Range







Lobby Water Damaged Ceiling



Supply Room Water Damaged Window



Supply Room Water Damaged Wall

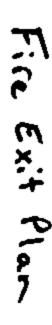


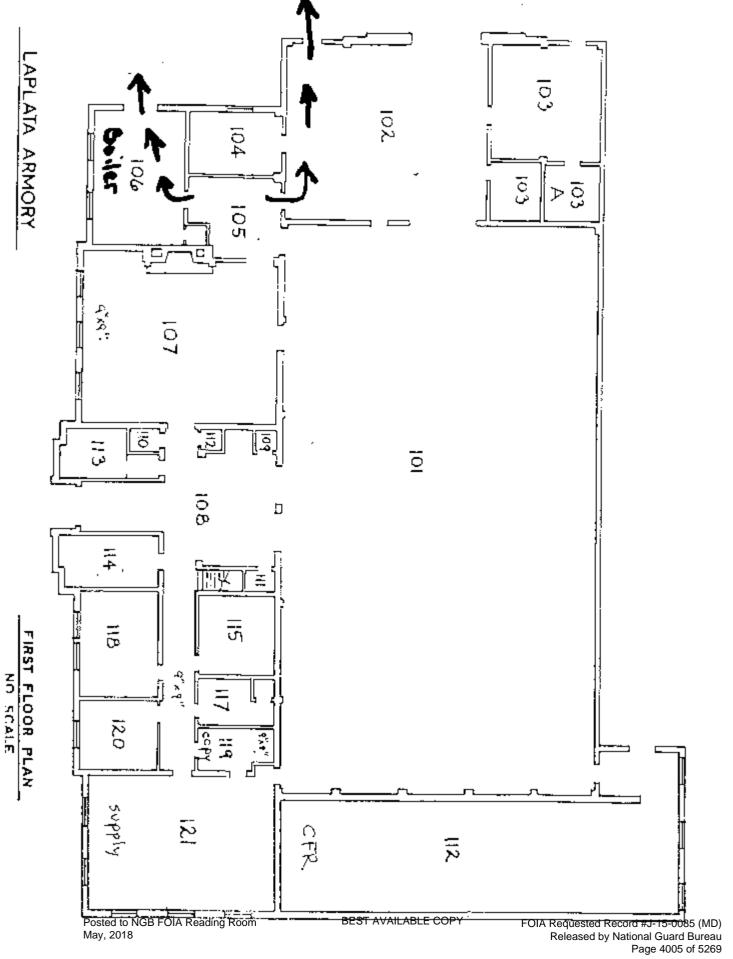
Boiler Room

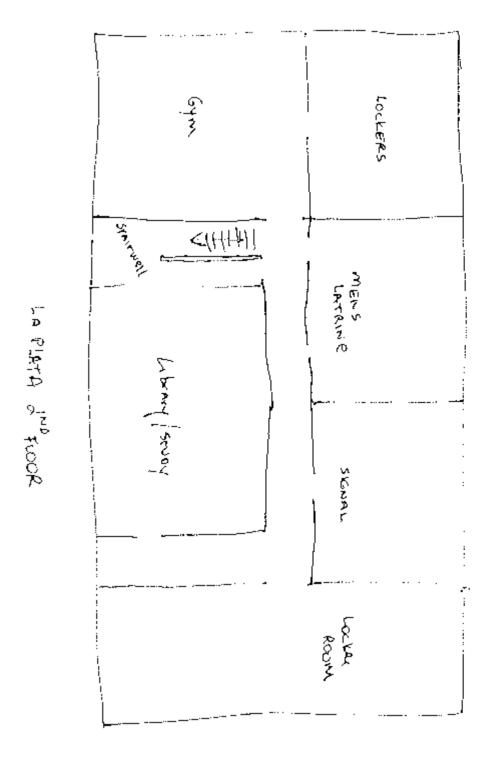


Locker Room Damaged Floor Tile

Appendix C. Floor Plan







Appendix D. References

- 1. Title 29 Code of Federal Regulations (CFR), Part 1910.1025, Occupational Safety and Health Administration, Occupational Exposure to Lead.
- 2. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices, 2013 Edition.
- 3. Industrial Ventilation: A Manual of Recommended Practice for Design, 28th Edition.
- 4. American National Standard Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Ventilation for Acceptable Indoor Air Quality, 62.1-2013.
- 5. RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 6. RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI.
- 7. National Emission Standard Hazardous Air Pollutants (NESHAP) The standards for asbestos are contained in 40 CFR 61.140 through 61.157.
- 8. National Ambient Air Quality Standards (NAAQS) National primary ambient air quality standards for carbon monoxide 40 CFR 50.8.
- 9. Environmental Protection Agency (EPA) standards [40 Code of Federal Regulations (CFR) 745.227 (h) (3)].
- 10. Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM).
- 11. The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, February 2002.
- 12. NG PAM 420-15 Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 Nov 06.
- 13. ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy, 55-2010.



DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

31 AUGUST 2005

MEMORANDUM FOR Region North Industrial Hygiene Office (NGB-AVS-SI-IH/Ms. Non-Responsive) Army National Guard Bureau, 301-IH Old Bay Lane, Havre de Grace, MD 21078

SUBJECT: Maryland Army National Guard Facilities Industrial Hygiene Baseline Surveys, Pikesville Military Reservation, MD, Project No. 55-ML-01ED-03/05

- 1. Enclosed is the final copy of the subject report and two CD-ROMs.
- 2. The project number for this service reflects the current fiscal year of dispatch and the actual field work which was completed for fiscal year 2003. The State of Maryland Army National Guard occupational health nurse was immediately notified in writing of findings necessitating immediate corrective action in Maryland armories. In addition the National Guard Bureau Region North Industrial Hygiene Office has been notified of all the results of lead in dust sampling conducted in all facilities. Draft reports were reviewed by you or other members of the National Guard and members of this Center, including our editorial staff, during drafting stages in report preparation leading up to the final report.
- 3. Our point of contact is Ms. Non-Responsive, at commercial (410) 436-5475/3118, DSN 584-5475/3118, or electronic mail: Non-Responsive @us.army.mil

FOR THE COMMANDER:

Non-Responsive

Encl

Director, Occupational Health Science

CF:

USACHPPM-NORTH, (MCHB-AN-IH/MR. Non-Responsive

Readiness thru Health



U.S. Army Center for Health Promotion and Preventive Medicine



MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS PIKESVILLE MILITARY RESERVATION BALTIMORE, MD PROJECT NO. 55-ML-01ED-03/05 22 AND 23 JULY 2003

Approved for public release; distribution unlimited

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World War II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed \$3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- ♦ Integrity is the foundation
- ♦ Excellence is the standard
- ♦ Customer satisfaction is the focus
- ♦ Its people are the most valued resource
- ♦ Continuous quality improvement is its pathway

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army Imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization fiercely proud of its history, yet equally excited about the future. It is destined to continue its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.



DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

EXECUTIVE SUMMARY
MARYLAND ARMY NATIONAL GUARD FACILITIES
INDUSTRIAL HYGIENE BASELINE SURVEYS
PIKESVILLE MILITARY RESERVATION
BALTIMORE, MD
PROJECT NO. 55-ML-01ED-03/05
22 AND 23 JULY 2003

1. PURPOSE OF EVALUATION. To conduct surveys at Maryland Army National Guard (MDARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions. This survey will serve to establish a baseline so that an occupational exposure history can be compiled for each civilian or military employee for the Defense Occupational and Environmental Health Readiness System.

2. CONCLUSIONS.

- a. <u>Lead in Air</u>. All air samples in the Armory and the John S. Edwards Administration Building were below the Occupational Safety and Health Administration (OSHA) standard of 50 μ g/m³ for lead in air. There were no overexposures to personnel from lead in air in these buildings.
- b. <u>Lead in Paint</u>. Deteriorated lead-based paint and lead-contaminated paint were identified in the Edwards Administration Building and in the Armory during the survey. Both buildings were repainted with non-lead-based paint in 2005.
- c. <u>Lead in Dust</u>. Levels of lead in dust that exceeded safe limits for children and adults were identified in Edwards Administration Building and in the Armory during the survey. The buildings have been cleaned; however, there may still be lead in dust in the buildings.
- d. <u>Safety Hazards.</u> Many safety hazards were observed in the Edwards Administration Building only during the survey. Upon completion of the survey, we immediately notified the MD NGB-Region North Office and LTC Non-Responsive, the MD State Occupational Health Nurse, of the safety violations. The Edwards Administration Building roof was damaged, causing the roof and ceiling to leak and portions of the ceiling to collapse. The Pikesville Military Reservation point of contact stated that all safety hazards have been corrected. The Merson Building roof was replaced in 2004. The Edwards Building roof was replaced in 2005. New drop ceilings were installed in both buildings.

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- e. <u>Mold and Moisture Problems</u>. Excessive moisture in the Edwards Administration Building due to the leaking roof had caused mold growth and standing water on the floors. Mold was also observed in the Armory. Mold exposure may cause illness in some employees. All mold has been removed from both buildings.
- f. <u>Safety and Occupational Health Programs</u>. There was no written Lead Hazard Management Plan (LHMP) for Pikesville Military Reservation. There was no written Hazard Communication (HAZCOM) Program for the Armory. These deficiencies may result in employee overexposure to hazardous materials. The OSHA requires employers to provide information to their employees concerning hazardous chemicals to which they are exposed. This is accomplished by establishing a HAZCOM Program for Armory employees. Program elements include the use of labels and other forms of warning, MSDSs, and information and training addressing protective measures for employees.

3. RECOMMENDATIONS.

- a. <u>Lead Exposure</u>. Health Hazard Risk Assessment Code (RAC) 3.
- (1) Develop and implement a LHMP for the Armory and the Edwards Administration Building.
- (2) Adult Lead Exposure. Clean all administrative area horizontal surfaces that have elevated lead levels to the NGB Region North and USACHPPM recommended safe limit for floors and frequently contacted surfaces. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after clean up. Cleaning dust containing lead may further prevent lead from becoming redistributed into adjacent rooms and resulting in exposures for children and for the general workforce. Ensure that personnel wear disposable gloves and disposable coveralls as extra protection when working in all areas identified as having elevated levels of lead.
- (3) Child Lead Exposure. Address all potential lead hazards in the Armory before continuing to extend use of this facility to children. Clean the floor in the Armory Drill Hall to the EPA lead in dust standards for young children, and clean other horizontal surfaces in the Drill Hall to the NGB Region North and USACHPPM decontamination level for lead in dust on frequently contacted surfaces.
- b. <u>Safety Hazards</u>. Safety Hazard RAC 5. Continue to monitor the condition of all Pikesville Military Reservation facilities.

EXSUM, MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

- c. Mold and Moisture Problems. Health Hazard RAC 5. If mold growth occurs in the future, refer to the guidance on moisture control and mold remediation in USACHPPM TG 278, Industrial Hygiene/Preventive Medicine Mold Assessment Guides, and USACHPPM TG 277, Army Facilities Management Information Document on Mold Remediation Issues.
- d. Safety and Occupational Health Programs. Health Hazard RAC 3. Establish a written HAZCOM Program for the Armory. Maintain records for HAZCOM training and store them in an accessible area.

Posted to NGB FOIA Reading Room

May, 2018

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DEPARTMENT OF THE ARMY

US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE 5158 BLACKHAWK ROAD ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-OFS

MARYLAND ARMY NATIONAL GUARD FACILITIES INDUSTRIAL HYGIENE BASELINE SURVEYS PIKESVILLE MILITARY RESERVATION BALTIMORE, MD PROJECT NO. 55-ML-01ED-03/05 22 AND 23 JULY 2003

- 1. REFERENCES. See Appendix A.
- 2. PURPOSE OF EVALUATION. To conduct surveys at Maryland Army National Guard (MDARNG) facilities to identify and measure the existence and extent of potentially hazardous operations or conditions. This survey will serve to establish a baseline so that an occupational exposure history can be compiled for each civilian or military employee for the Defense Occupational and Environmental Health Readiness System.
- 3. AUTHORITY. Fax, National Guard Bureau (NGB) Region North Industrial Hygiene Office (NGB-AVS-SI-IH/Ms. Vanessa Franchere), 28 February 2003, subject: SAB.
- 4. BACKGROUND INFORMATION.
- a. <u>Armory Mission and Units</u>. The Pikesville Military Reservation mission is training and mobilization. We surveyed the John S. Edwards Administration Building, the home of the Headquarters (HQ) 3rd Brigade; the MAJ General John Purley Cooper, Jr. Armory; the NCO Club, and the Col. Bernard D. Merson Building. In addition to the HQ 3rd Brigade, the units located in these facilities are the 32nd Weapons of Mass Destruction team, the 29th Joint Task Force, the B Company 129th Signal company, the C/2 110th FA Control, the HHS/2-110th FA Control, the Distance Education Center, and the State of Maryland Maintenance Team.
- b. <u>Date of Construction</u>. The Pikesville Military Reservation buildings were constructed in 1903.
- c. <u>Armory Use by Children</u>. SFC Non-Responsive, a Pikesville Military Reservation point of contact (POC), stated that the use of the Armory for children is occasional. The Armory sponsors community events and shows for the public monthly, and children are present in the Armory during these times. The Maryland Military Department is currently advertising Pikesville Armory as available for rental for activities that include young children.

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d. <u>Points of Contact</u>. SGM Non-Responsive, Manager 410-653-6755 and SFC Non-Responsive 410-653-6715, Pikesville Military Reservation, 610 Reisterstown Road, Baltimore, MD 21208-5197.

5. FACILITY EVALUATION.

a. Safety Hazards.

- (1) Many safety hazards were observed in the Edwards Administration Building during the survey. Upon completion of the survey, we immediately notified the MD NGB-Region North Office and LTC Non-Responsive, the MD State Occupational Health Nurse, in writing of several safety violations in the Edwards Administration Building.
- (2) The Edwards Administration Building roof was damaged, causing the roof and ceiling to leak, portions of the ceiling to collapse, and standing water on the floor. In Room 21, and in some areas of the second floor, roof leaks caused light fixtures to fall onto the floor (See Appendix B Photographs 1338 & 1339). The roof was caving in on the second floor and occupants had abandoned some areas. There were also ceiling leaks in Room 09 (Photographs 1346 & 1347). Personnel vacated offices due to the collapsing ceiling (Photographs 1334 & 1335). The leaking roof caused the ceiling to collapse in Room 19 (Photograph 1337).
- b. <u>Sampling Locations and Results</u>. Samples were collected for lead in air, on surfaces (wipe samples), and in paint to determine the presence of lead hazards. Lead sample results and locations are shown in Appendix C.
- c. <u>Paint</u>. The age of the buildings indicated that the presence of paint containing lead was likely. Deteriorated paint was observed throughout the buildings.
- d. <u>Asbestos</u>. Staff Sergeant (SSG) Roberts, Environmental Compliance Assessment Coordinator for the Maryland NGB, stated that all asbestos had been abated in the buildings.
- e. <u>Mold and Moisture Problems</u>. Mold was observed on the walls and doors in the Edwards Administration Building. The Administration 1 area in the basement (Photographs 1340-1343) had been restricted from office use due to mold growth and deterioration of the walls. Water damage to walls and condensation from pipes was observed and reported by the occupants. Mold was also observed in the Armory.
- f. <u>Indoor Firing Range</u>. SSG stated that all lead in the converted indoor firing range (IFR) had been abated during its conversion.

- g. <u>Safety and Occupational Health Programs</u>. There were no safety and occupational health program records in the facilities. Pikesville Military Reservation should have a written Lead Hazard Management Plan (LHMP) and a Hazard Communication (HAZCOM) Program.
- h. <u>Heating, Ventilation, and Air-Conditioning Systems</u>. Ventilation and air were provided by window-mounted air conditioning units and the manual operation of windows. Heat was provided by oil and steam heat. The NCO room heat was provided by steam. No ventilation problems were observed or reported.
- i. <u>Noise Dosimetry</u>. No operations with the potential to generate hazardous noise levels were identified.
- 6. ASSESSMENT CRITERIA FOR LEAD. See Appendix D for details.
- a. <u>Lead in Air</u>. The Army complies with the Occupational Safety and Health Administration (OSHA) 8-hour time-weighted average Permissible Exposure Limit of 50 micrograms of lead per cubic meter (μg/m³) of air.
- b. <u>Lead in Dust</u>. The Environmental Protection Agency (EPA) and State of Maryland limits for lead in dust are 40 micrograms per square foot ($\mu g/ft^2$) on floors, 250 $\mu g/ft^2$ on window sills, and 400 $\mu g/ft^2$ in window troughs. These limits apply to pre-1978 Army facilities only if children under 6 years of age occupy them for 60 or more hours per year. The NGB Region North concurs with the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) recommended safe limit of 200 $\mu g/ft^2$ on floors and frequently contacted surfaces, which is more stringent for window sills than the EPA/State standards.
- c. <u>Lead in Paint</u>. Paint containing lead levels of 0.5 percent or more by weight in dried solid (also reported as 5000 milligrams per kilogram) is considered to be lead-based paint according to both Federal and Maryland State Regulations. Paint containing lead levels of more than 0.7 milligrams per square centimeter is considered to be lead-based paint according to Maryland State Regulations. In Army Regulation (AR) 420-70, Buildings and Structures, lead-contaminated paint is defined as any paint containing detectable amounts of lead. The Army considers lead-contaminated paint to be potentially hazardous to children if it is disturbed or deteriorating.
- d. <u>Lead Carcinogenicity</u>. The Department of Health and Human Services National Toxicology Program (NTP) released the Report on Carcinogens, Eleventh Edition in February 2005. The NTP report lists "lead and lead compounds" as "reasonably anticipated to be human carcinogens".
- 7. SAMPLING RESULTS, DISCUSSION, AND CONCLUSIONS.

- a. <u>Lead in Air</u>. All air samples in the Armory and the in the Edwards Administration Building were below the Occupational Safety and Health Administration (OSHA) standard of 50 μ g/m³ for lead in air. There were no overexposures to personnel from lead in air in these buildings.
- b. <u>Lead in Paint</u>. At the time of the survey there was deteriorated lead-based paint (LBP) in the Edwards Administration building and and lead-contaminated paint (LCP) in the Armory. The POC stated that both buildings were repainted with non-lead-based paint in 2005.
- c. <u>Lead in Dust</u>. Lead in dust wipe sampling locations and results are in the Table below. Levels of lead in dust that exceeded safe limits for children and adults were identified during the survey. The POC stated that dust has been cleaned in the buildings. However, there may still be lead in dust in the buildings.
- (1) Adult Lead Exposure. In the Edwards Administration Building, deteriorated LCP was collected from the window sill in room 8 (photo #1331). Surface wipe samples exceeding the USACHPPM and the NGB Region North decontamination guidance were collected in the windowsill in the room 14 break room (photo #1328) and the window sill in room 8 (photo #1331).

In the Armory, three of the surface wipe samples exceeding the USACHPPM and the NGB Region North decontamination guidance were collected in the area of the converted IFR. One was collected from the floor of the old IFR bullet trap (photo #1323); one on the bench of the old IFR near what used to be the plenum (photo #1324); and one on the floor under the radiator in the old IFR (photo #1326). This sample contained the highest level of lead (> 13,000 μ g/ft²). Additional samples exceeding the guidelines were collected from the window sill of the Physical Training area on the third floor (photo #1368), the floor of the vault area of room 8 on the second floor (photo #1365), and the floor of the vault area near the main door (photo #1367).

(2) Child Lead Exposure. Ten lead in dust wipe samples in the Armory exceeded Federal and State of Maryland lead exposure levels for children. There is a potential hazard for children using this facility. Some of the results are several hundred times the Federal standard for lead in dust, with a maximum result of $13,000 \, \mu g/ft^2$.

TABLE. Lead in Dust Wipe Locations and Analytical Results.

Wipe Sample #	Location of Samples	Conc. (μg/ft²)
PIW01	ARMORY DRILL FLOOR NEAR CENTER EXIT	<23
PIW02	ARMORY BLEACHER NEAR CLASSROOM #4	<23
PIW03	ARMORY DOOR TO KITCHEN & SMOKING AREA FROM ARMORY	26
PIW04	ARMORY TOP OF ICE MAKER CANTEEN AREA	BDL
PIW05	ARMORY FORMER IFR BULLET TRAP FLOOR	6436
PIW06	ARMORY FORMER IFR BENCH NEAR FORMER SUPPLY PLENUM	747
PIW07	ARMORY FLOOR OUTSIDE FORMER IFR DOOR	39
PIW08	ARMORY FORMER IFR UNDER RADIATOR	13818
PIW09	ARMORY WINDOW SILL NEAR ROOM 210	136
PIW10	ARMORY WINDOW SILL IN BREAKROOM	455
PIW11	ARMORY ROOM 8 (CONFERENCE AREA) TOP OF BOOKCASE	<23
PIW12	ARMORY STEP IN ROOM 8 LEADING TO CHIEF OPS SGT	<23
PIW13	ARMORY RECRUITMENT OFFICE ROOM 11 TOP OF BOOKCASE	<23
PIW14	ARMORY ROOM 11 TOP OF SWITCH STATION	<23
PIW15	ROOM 21 FLOOR UNDER FALLEN LIGHT FIXTURE	<23
PIW16	ARMORY FLOOR IN VAULT AREA (ROOM # 8) SECOND FLOOR	207
PIW17	ARMORY FLOOR VAULT AREA OUTSIDE # 11	129
PIW18	ARMORY FLOOR VAULT AREA NEAR MAIN DOOR	511
PIW19	ARMORY WINDOW SILL OF PT AREA THIRD FLOOR	238
PIW20	ARMORY CAGE FLOOR # 307 AREA THIRD FLOOR	92
PIW21	NCO CLUB FIREPLACE MANTLE	<23
PIW22	KITCHEN COUNTER NCO CLUB	<23
PIW23	MERSON BLDG WINDOW SILL SECOND FLOOR PERSONNEL OFFICE/	<23
PIW24	MERSON BLDG CLASSROOM FLOOR CORNER	<23
PIW25	MERSON BLDG BEHIND DOOR TO EXIT IN CORNER OF FLOOR	<23

d. <u>Safety Hazards</u>. The POC stated that all safety hazards have been corrected. The Merson Building roof was replaced in 2004. The Edwards Administration Building roof was replaced in 2005. New drop ceilings were installed in both buildings.

e. Mold and Moisture Problems. Excessive moisture in the Edwards Administration

Building due to the leaking roof had caused mold growth and standing water on the floors. Mold was also observed in the Armory. Mold exposure may cause illness in some employees. All mold has been removed from both buildings.

- f. <u>Safety and Occupational Health Programs</u>. There was no written HAZOM Program for the Armory. This deficiency may result in employee overexposure to hazardous materials in the Armory. The OSHA requires employers to provide information to their employees concerning hazardous chemicals to which they are exposed. This is accomplished by establishing a HAZCOM Program for Armory employees. Program elements include the use of labels and other forms of warning, MSDSs, and information and training addressing protective measures for employees.
- 8. RECOMMENDATIONS. The Department of Defense Instruction 6055.1 provides Risk Assessment Codes (RACs) for health hazards, a procedure which allows assessment of the magnitude of exposure to physical, chemical, and biological agents and the possible medical effects of exposure. The RAC is an expression of the risk associated with the hazard and combines the hazard severity and accident probability into a single number. The RACs enable one to prioritize hazards. They range in magnitude from 1 to 5, with 1 being the highest priority.
 - a. <u>Lead Exposure</u>. Health Hazard RAC 3.
 - (1) Develop and implement a LHMP.
- (2) Adult Lead Exposure. Clean all administrative area horizontal surfaces that have elevated lead levels to the NGB Region North and USACHPPM recommended safe limit for floors and frequently contacted surfaces. Comprehensive guidelines for cleaning are in Appendix E. Consult with the MDARNG Environmental Coordinator concerning waste disposal requirements after clean up. Cleaning dust containing lead may further prevent lead from becoming redistributed into adjacent rooms and resulting in exposures for children and for the general workforce. Ensure that personnel wear disposable gloves and disposable coveralls as extra protection when working in all areas identified as having elevated levels of lead.
- (3) Child Lead Exposure. Address all potential lead hazards in the Armory before continuing to extend use of this facility to children. Clean the floor in the Armory Drill Hall to the EPA lead in dust standards for young children, and clean other horizontal surfaces in the Drill Hall to the NGB Region North and USACHPPM decontamination level for lead in dust on frequently contacted surfaces.
- b. <u>Safety Hazards</u>. Safety Hazard RAC 5. Continue to monitor the condition of all the facilities.

10. ADDITIONAL ASSISTANCE. For additional assistance, or questions concerning this report, please contact the undersigned at DSN 584-3118, commercial 410-436-3118, or by Electronic mail to: Non-Responsive @us.army.mil



Industrial Hygienist USACHPPM Lead and Asbestos Team Leader Industrial Hygiene Field Services Program

APPROVED:

Non-Responsive

Technical Program Manager Industrial Hygiene Field Services Program

MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

- 1. Title 29, Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Administration, current edition. http://www.osha.gov/comp-links.html
- 2. Department of Defense Instruction (DODI) 6055.1, Department of Defense Occupational Safety and Health (OSH) Program, August 19, 1998. http://www.dtic.mil/whs/directives/corres/pdf/i60551_081998/i60551p.pdf
- 3. AR 40-5, Medical Service, Preventive Medicine, 15 October 1990. http://www.usapa.army.mil/pdffiles/r40_5.pdf
- 4. AR 385-10, The Army Safety Program, 29 February 2000. http://www.usapa.army.mil/pdffiles/r385_10.pdf
- 5. DA PAM 40-503, Medical Services, Industrial Hygiene Program, 30 October 2000. http://www.usapa.army.mil/pdffiles/p40_503.pdf
- 6. American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs), ACGIH Cincinnati, OH, 2005. http://www.acgih.org/TLV/
- 7. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) 62-2002, Ventilation for Acceptable Indoor Air Quality.
- 8. Illuminating Engineering (February 1, 1993) RP-1-1993, American National Standard Practice for Office Lighting, ANSI/IES RP-1-1993.
- 9. USACHPPM Interim Report No. 39-EJ-1157-99, Derivation of Wipe Surface Screening Levels for Environmental Chemicals, 1999.
- 10. OSHA Instruction, CPL 02-02-058 CPL 2-2.58 29 CFR 1926.62, Lead Exposure In Construction; Interim Final Rule-- Inspection and Compliance, Procedures, 1993. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1570
- 11. U.S. Department of Housing and Urban Development (HUD), Technical Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing 1998. http://www.hud.gov/offices/lead/guidelines/hudguidelines/index.cfm

MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX B

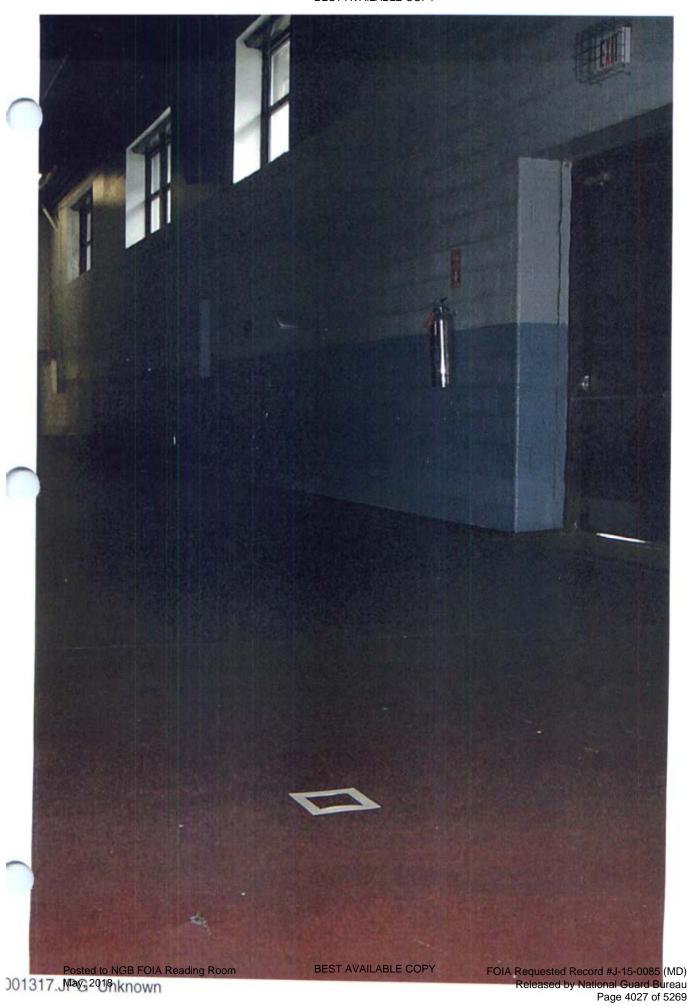
PHOTOGRAPHS

Pikesville Photographs Showing Location of Lead Paint and Dust Wipe Samples

Photo #	Location of Samples
1317	ARMORY MAIN DRILL FLOOR NEAR CENTER EXIT
1318	ARMORY BLEACHER NEAR CLASSROOM #4
1319	ARMORY DOOR TO KITCHEN & SMOKING AREA FROM ARMORY
1320	ARMORY TOP OF ICE MAKER IN CANTEEN AREA
1323	ARMORY FORMER IFR BULLET TRAP FLOOR
1324	ARMORY FORMER IFR BENCH NEAR SUPPLY PLENUM
1325	ARMORY FLOOR ONE FOOT OUTSIDE DOOR TO FORMER IFR
1326	ARMORY FORMER IFR UNDER RADIATOR
1327	ARMORY WINDOW SILL NEAR ROOM 210
1328	ADMINISTRATION WINDOW SILL IN BREAKROOM (ROOM 14)
1329	ADMINISTRATION ROOM 8 (CONFERENCE AREA) TOP OF BOOKCASE
1330	ADMINISTRATION STEP IN ROOM 8 LEADING TO CHIEF OPS SGT
1331	ADMINISTRATION DETERIORATED LEAD-BASED PAINT WINDOW SILL ROOM 8
1332	ADMINISTRATION RECRUITMENT OFFICE ROOM 11 TOP OF BOOKCASE
1333	ADMINISTRATION RECRUITMENT OFFICE
1334	ADMINISTRATION ROOM 11 TOP OF SWITCH STATION
1335	ADMINISTRATION ROOM 21 ON FLOOR UNDER FALLEN LIGHT FIXTURE
1336	ADMINISTRATION ROOF LEAK DUE TO FALLEN LIGHT FIXTURE
1337	ADMINISTRATION ROOF LEAK DUE TO FALLEN LIGHT FIXTURE
1338	ADMINISTRATION FLOOR IN VAULT AREA (ROOM # 8) SECOND FLOOR
1339	ADMINISTRATION COLLAPSING CEILING DUE TO ROOF LEAK
1340	ADMINISTRATION HQ3RD BDE ADMIN AREA 1 OFF LIMITS DUE TO MOLD GROWTH
1341	ADMINISTRATION HQ3RD BDE ADMIN AREA 1 OFF LIMITS DUE TO MOLD GROWTH
1342	ADMINISTRATION HQ3RD BDE ADMIN AREA 1 OFF LIMITS DUE TO MOLD GROWTH
1343	ADMINISTRATION HQ3RD BDE ADMIN AREA 1 OFF LIMITS DUE TO MOLD GROWTH
1344	ADMINISTRATION CEILING LEAKS IN ROOM 09
1345	ADMINISTRATION CEILING LEAKS IN ROOM 09
1346	ADMINISTRATION CEILING LEAKS IN ROOM 09
1347	ADMINISTRATION CEILING LEAKS IN ROOM 09
1348	ADMINISTRATION CEILING LEAKS IN ROOM 09
1349	ADMINISTRATION CEILING LEAKS IN ROOM 09
1365	ARMORY FLOOR VAULT AREA OUTSIDE # 11
1366	ARMORY FLOOR VAULT AREA NEAR MAIN DOOR
1368	ARMORY WINDOW SILL OF PT AREA ON THIRD FLOOR

Pikesville Photographs Showing Location of Lead Paint and Dust Wipe Samples

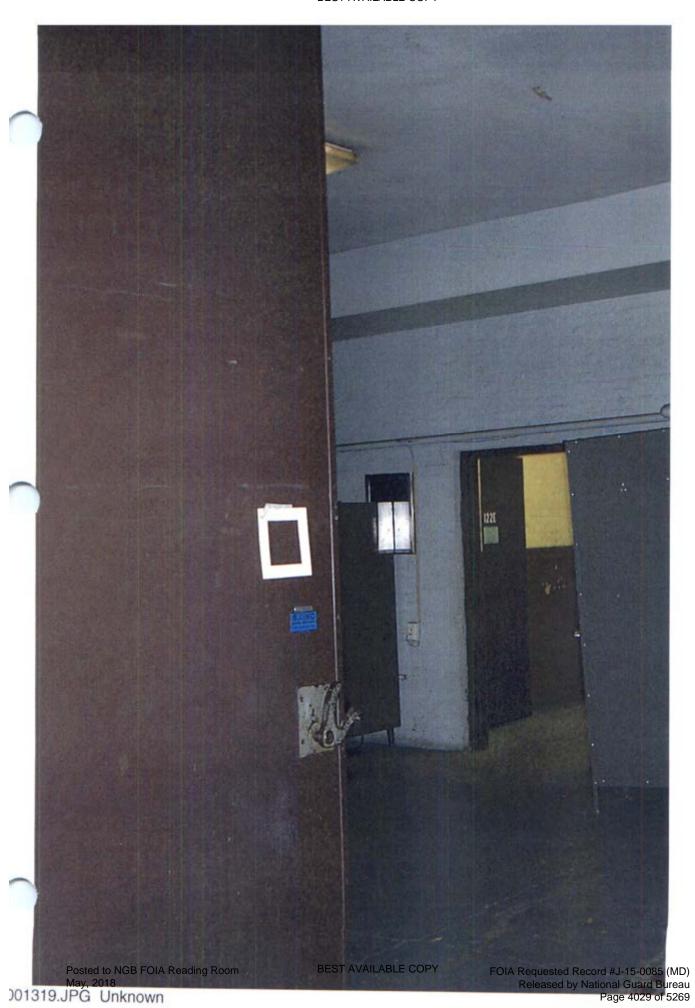
Photo #	Location of Samples
1369	ARMORY WINDOW SILL OF PT AREA ON THIRD FLOOR
1370	ARMORY FLOOR OF CAGE # 307 AREA THIRD FLOOR
1371	NCO CLUB FIREPLACE MANTLE
1372	NCO CLUB BULK SAMPLE DETERIORATED PAINT
1373	NCO CLUB KITCHEN COUNTER
1374	MERSON BUILDING WINDOW SILL SECOND FLOOR PERSONNEL OFFICE
1375	MERSON BUILDING CLASSROOM
1376	MERSON BUILDING CLASSROOM FLOOR CORNER
1377	MERSON BUILDING BEHIND DOOR TO EXIT IN CORNER OF FLOOR

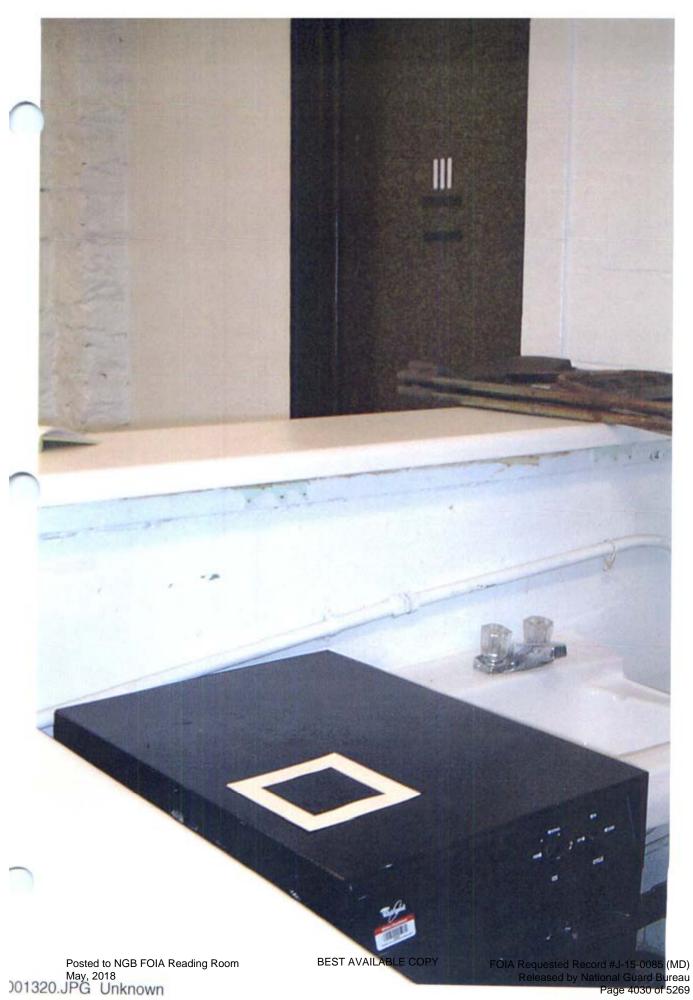


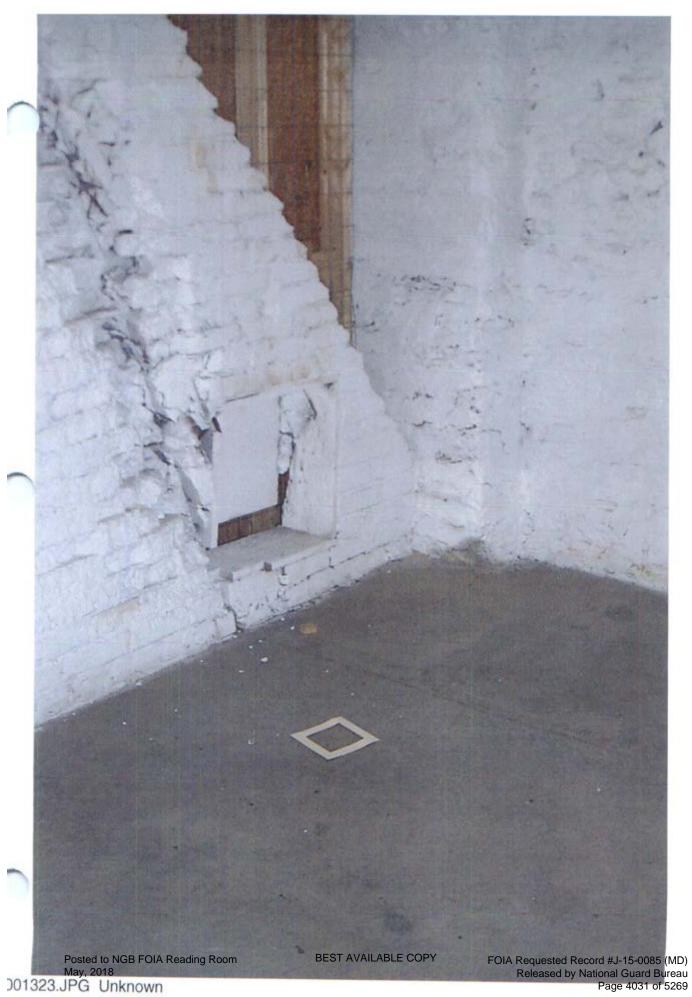


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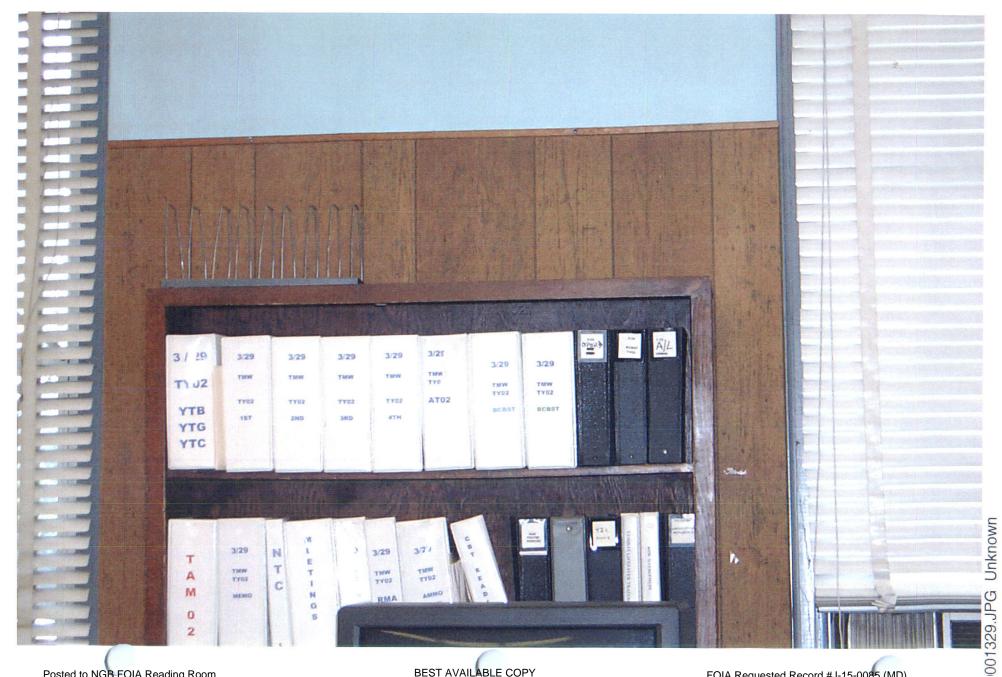
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FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 4033 of 5269









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FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 4037 of 5269





Posted to NGB FOIA Reading Room May, 2018

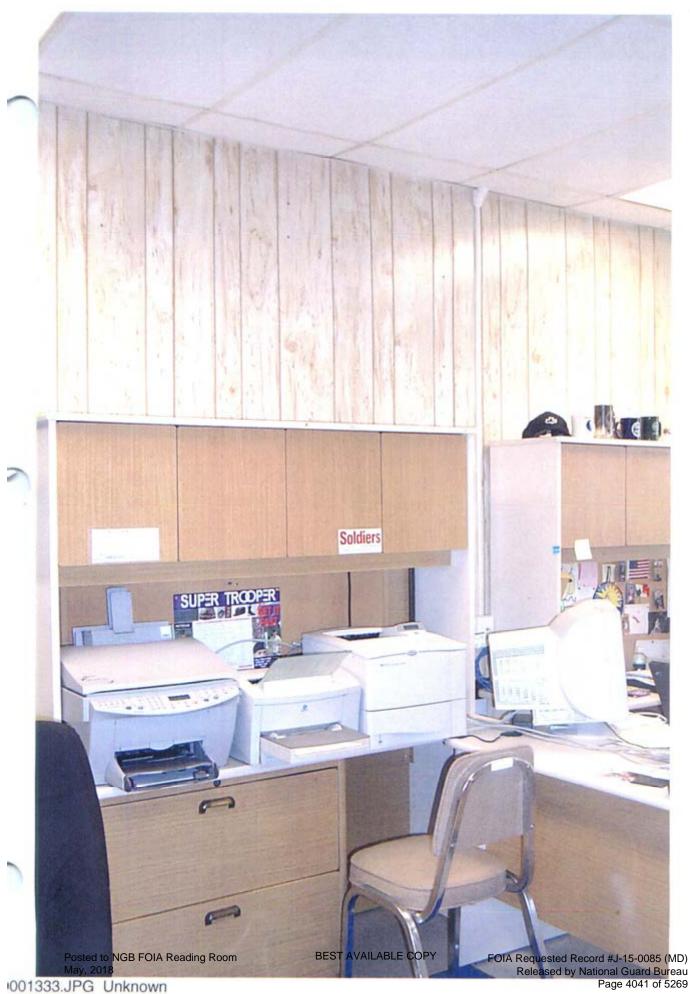
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FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 4040 of 5269











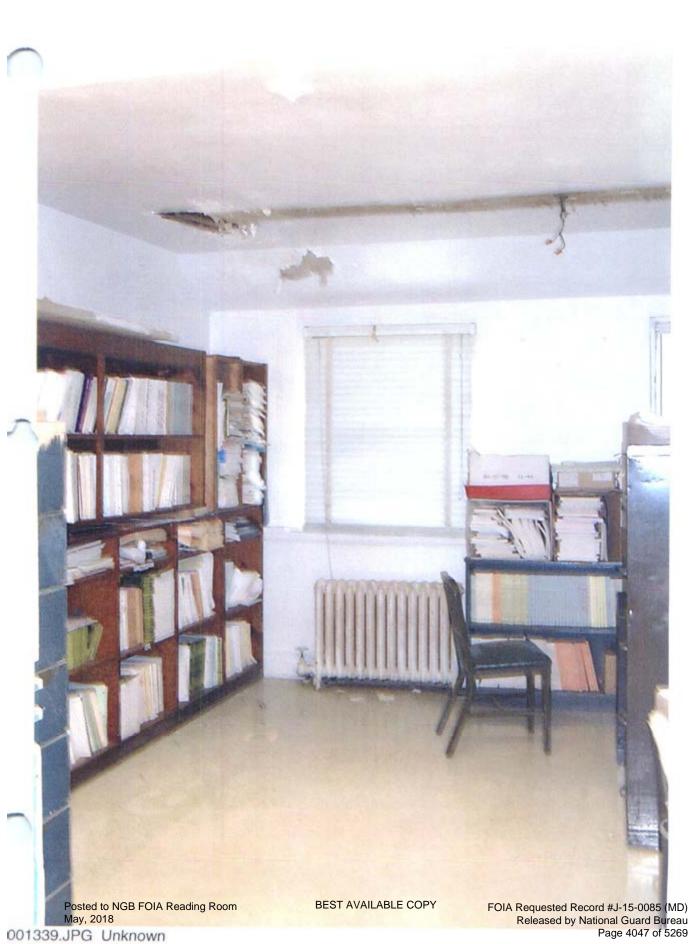
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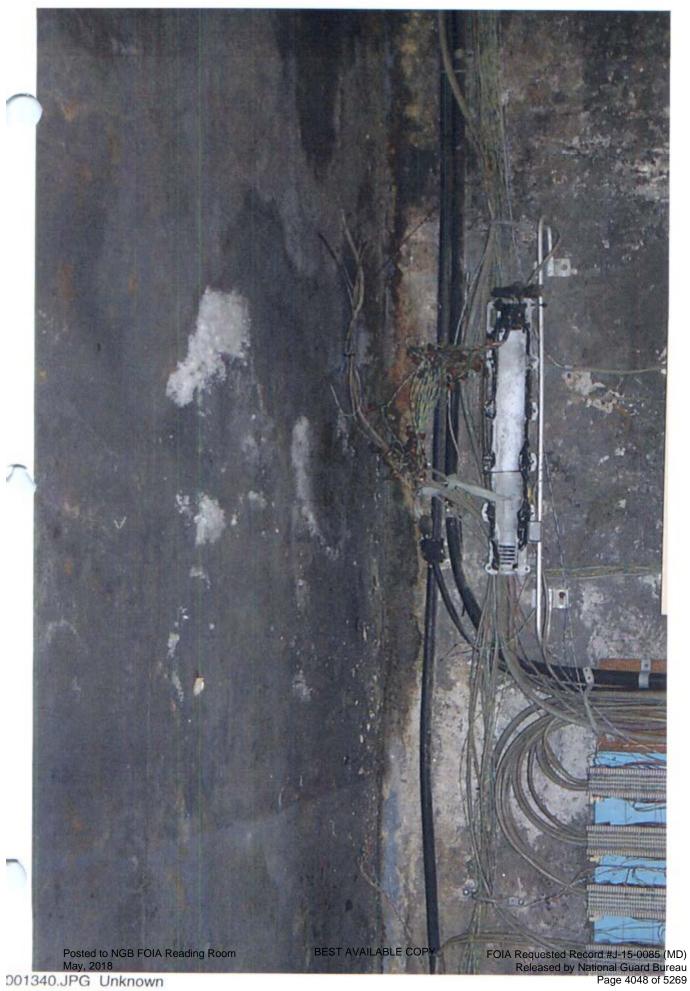


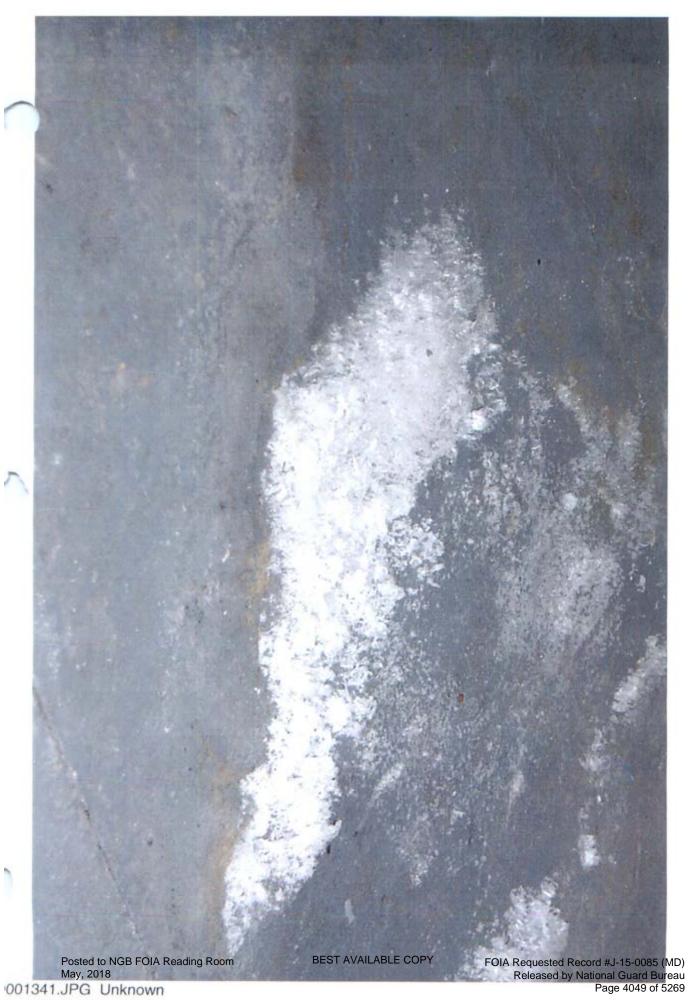
Posted to NGB-FOIA Reading Room May, 2018

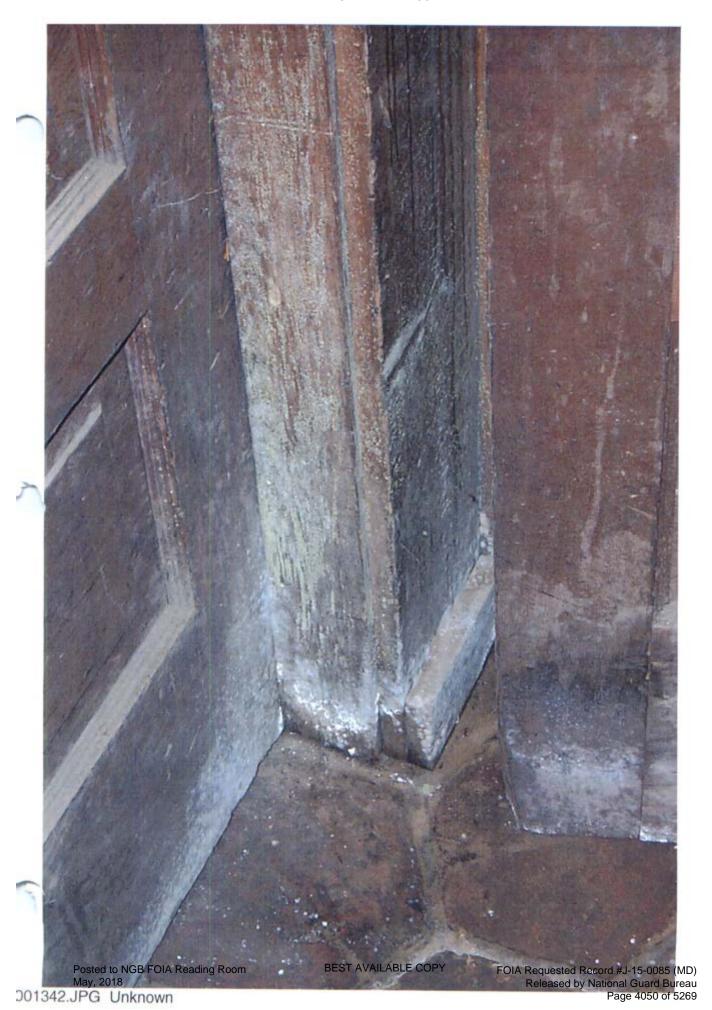
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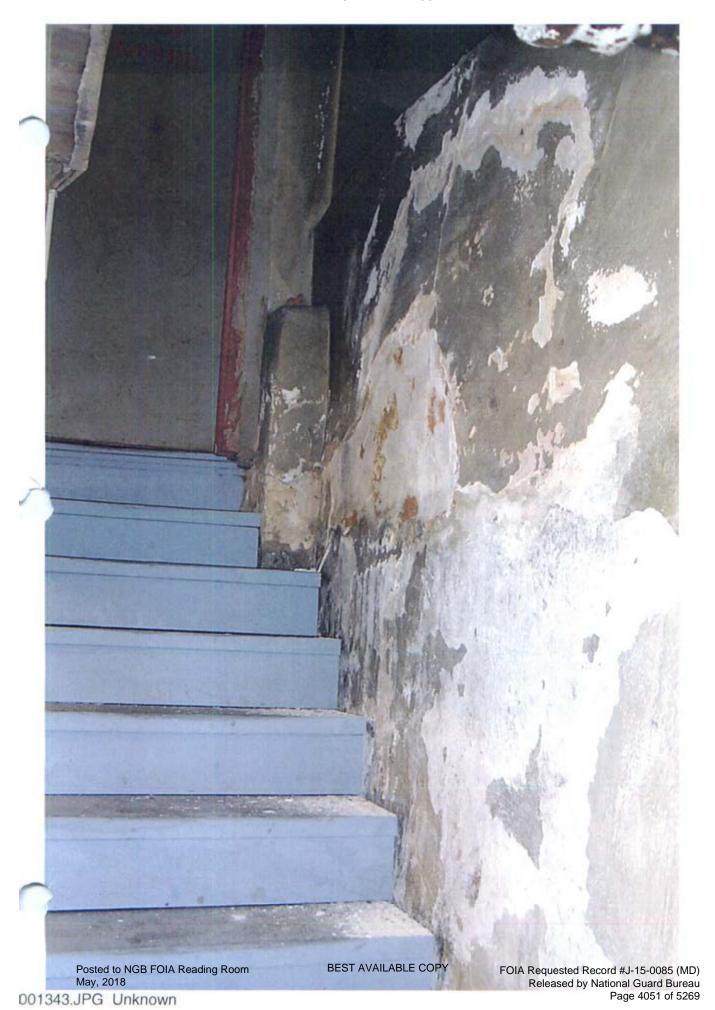


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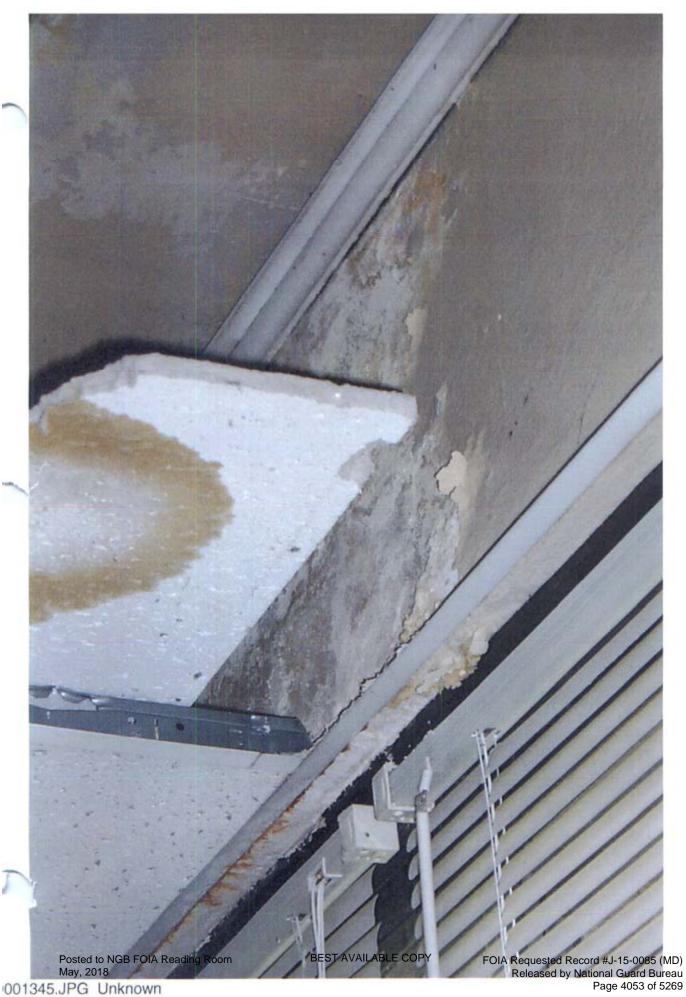




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FOIA Requested Record #J-15-0085 (MD) Released by National Guard Bureau Page 4052 of 5269





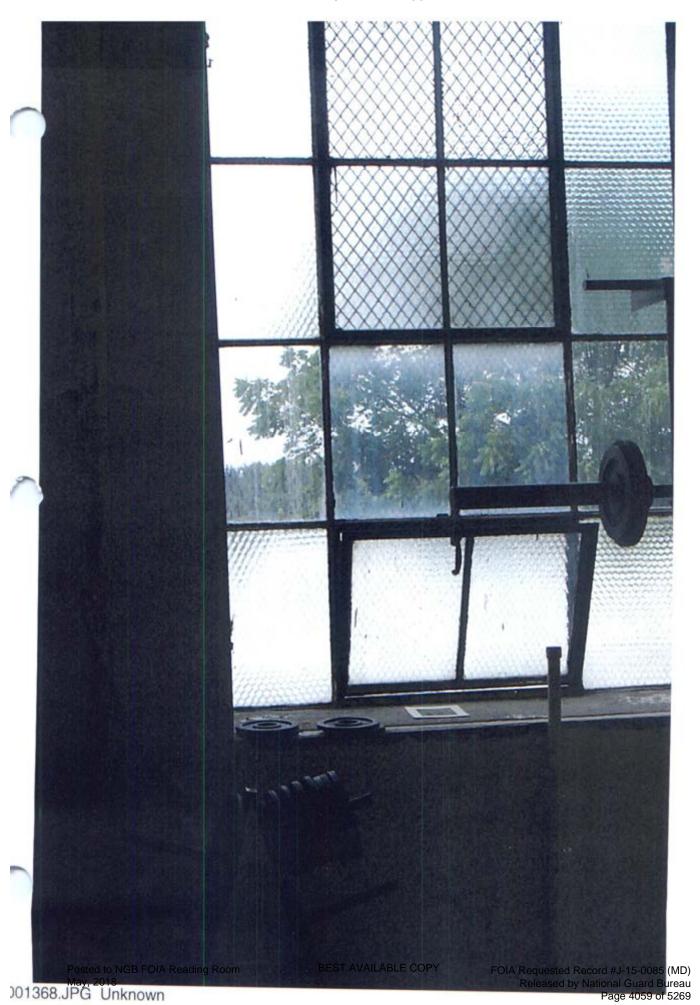


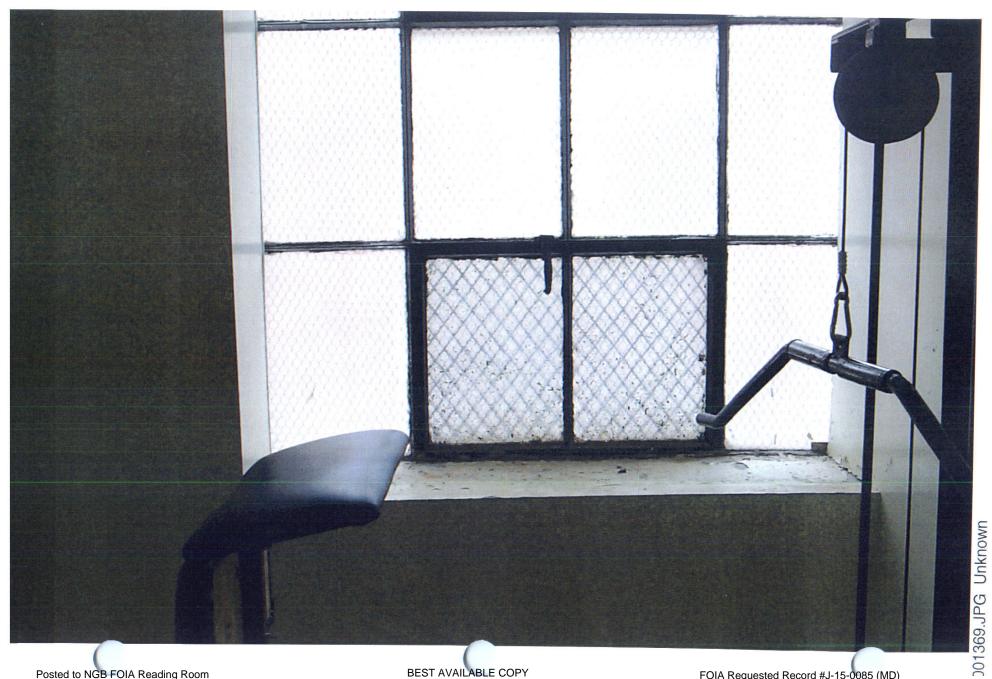


Posted to NGB FOIA Reading Room May, 2018









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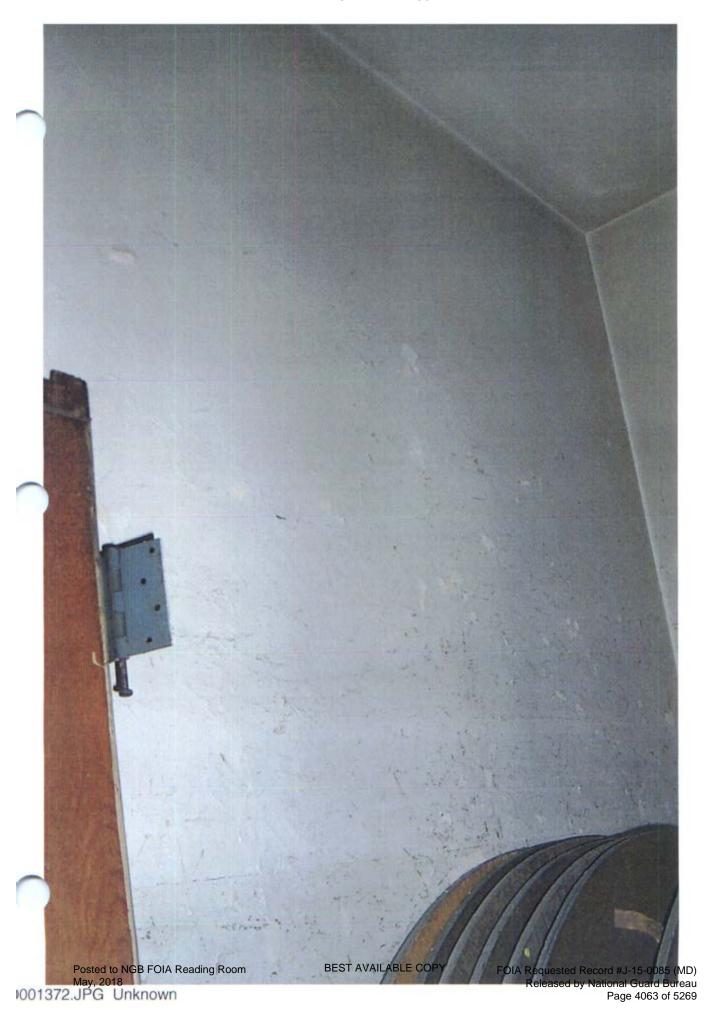
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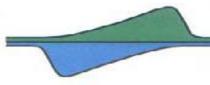


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MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX C

SAMPLING SHEETS AND LABORATORY ANALYSES



Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

August 8, 2003

Laboratory Code: RES
Subcontract Number: NA

Laboratory Report: RES 96061-1
Project Description: None Given
None Given

Non-Responsive

Army National Guard IH - West 3401 Quebec Street, Suite 7200 Denver CO 80207

Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the American Industrial Hygiene Association, Lab ID 101533 - Accreditation Certificate #480. The laboratory is currently proficient in both PAT & ELPAT programs respectively.

Reservoirs has analyzed the following sample(s) using Atomic Emission Spectroscopy - Inductively Coupled Plasma (AES-ICP) per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the analysis table. Results have been sent to your office.

RES 96061-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those authorized by the client. Samples will be disposed of after sixty days unless longer storage is requested. If you should have any questions about this report, please feel free to call me at 303-964-1986.

Non-Responsive

President

RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD BY WIPE SAMPLING

RES Job Number: RES 96061-1

Client: **Army National Guard IH - West**

Client Project Number / P.O.: **None Given** Client Project Description: None Given Date Samples Received: July 30, 2003

Analysis Type: USEPA SW846 3050B / AA(7420)

Turnaround: 3-5 Day

Date Samples Analyzed: August 4, 2003

Client	Lab	Sample	LEAD	Detection	LEAD
ID Number	ID Number	Area	(μg)	Limit	CONCENTRATION
		(sq ft.)		$(\mu g/sq.ft.)$	(µg/sq.ft.)
PI Blank 1	EM 800587	0.11	BDL	23	BDL
PI Blank 2	EM 800588	0.11	BDL	23	BDL
PI Blank 3	EM 800589	0.11	BDL	23	BDL
PI Blank 4	EM 800590	0.11	BDL	23	BDL
PI W16	EM 800591	0.11	22.8	23	207
PI W17	EM 800592	0.11	14.2	23	129
PI W18	EM 800593	0.11	56.2	23	511
PI W19	EM 800594	0.11	26.2	23	238
PI W20	EM 800595	0.11	10.1	23	92
PI W21	EM 800596	0.11	BDL	23	BDL
PI W22	EM 800597	0.11	BDL	23	BDL
PI W23	EM 800598	0.11	BDL	23	BDL
PI W24	EM 800599	0.11	BDL	23	BDL
PI W25	EM 800600	0.11	BDL	23	BDL
PI Blank 5	EM 800601	0.11	BDL	23	BDL
PI Blank 6	EM 800602	0.11	BDL	23	BDL
DK Blank 01	EM 800603	0.11	BDL	23	BDL
DK W01	EM 800604	0.11	BDL	23	BDL
DK W02	EM 800605	0.11	BDL	23	BDL
DK W03	EM 800606	0.11	BDL	23	BDL
DK W04	EM 800607	0.11	BDL	23	BDL
DK W05	EM 800608	0.11	5200.0	23	47273
DK W06	EM 800609	0.11	107.0	23	973
DK W07	EM 800610	0.11	37.8	23	344
DK W08	EM 800611	0.11	BDL	23	BDL
DK W09	EM 800612	0.11	7.2	23	65
DK W10	EM 800613	0.11	57.0	23	518
DK Blank 02	EM 800614	0.11	BDL	23	BDL
DK W11	EM 800615		S	ample not submi	itted
DK Blank 03	EM 800616	0.11	BDL	23	BDL

May, 2018



Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

REMIT TO: 2059 Bryant St. Denver, CO 80211

Invoice to:

Army National Guard IH - West 3401 Quebec Street, Suite 7200 Denver CO 80207 Invoice Date: August 8, 2003 Invoice Number: 96061-1

TERMS: Net 30 Days

Service Charge of 18% per annum may by charged on past due invoices.

Quantity		Unit Price	Amount			
	RES Job #: Desc: Submitted By: P/O No: Contact:	96061-1 None Given Army National (None Given Non-Responsive	Guard IH - West			
30	AA/ICP Metal	Wipe	3-5 Day	4125-02	\$7.50	\$225.00

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RESERVOIRS ENVIRONMENTAL, INC.

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	and the second second			BULK:	PLM	Short report. Long report. +/-, Quant, Semi-quant	Point Count	
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PI W		-					92	
PIL							93	
PT 4	Annia del Trans						94	
PI	10/19		_			-	95	
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PI	WZZ						- 98	
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Phone: (303) 964-1966 Fax: (303) 477-4275 WATS: 1-864-RESI ENV (737-4366)
PAGER: ONCALL Pager number available at Lab. Altornate Pagers: PLMTEM 509-2187 PCM/Metals 509-2088 (AFTER HOURS USE ONLY)

RESERVOIRS ENVIRONMENTAL, INC.

2059 Bryant St., Denver CO 80211

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Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

August 7, 2003

Laboratory Code: RES Subcontract Number: NA

Laboratory Report: RES 96063-1 Project Description: None given None given

Non-Responsive

Army National Guard IH - West 3401 Quebec Street, Suite 7200 Denver CO 80207

Dear Customer.

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the American Industrial Hygiene Association, Lab ID 101533 - Accreditation Certificate #480. The laboratory is currently proficient in both PAT & ELPAT programs respectively.

Reservoirs has analyzed the following sample(s) using Atomic Emission Spectroscopy - Inductively Coupled Plasma (AES-ICP) per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the analysis table. Results have been sent to your office.

RES 96063-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those authorized by the client. Samples will be disposed of after sixty days unless longer storage is requested. If you should have any questions about this report, please feel free to call me at 303-964-1986.

Sincerely,



President

BEST AVAILABLE COPY

RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Accredited Laboratory #101896 AIHA Certificate of Accredidation #480 LAB ID 101533

TABLE ANALYSIS: LEAD BY WIPE SAMPLING

RES Job Number: RES 96063-1

Client: Army National Guard IH - West

Client Project Number / P.O.: None given
Client Project Description: None given
Date Samples Received: July 30, 2003

Analysis Type: **USEPA SW846 3050B / AA(7420)**

Turnaround: 3-5 Day

Date Samples Analyzed: August 4, 2003

Client	Lab	Sample	LEAD	Detection	LEAD
ID Number	ID Number	Area	(μg)	Limit	CONCENTRATION
		(sq ft.)		$(\mu g/sq.ft.)$	(μg/sq.ft.)
PI W01	EM 800631	0.11	BDL	23	BDL
PI W02	EM 800632	0.11	BDL	23	BDL
PI W03	EM 800633	0.11	2.9	23	26
PI W04	EM 800634	0.11	BDL	23	BDL
PI W05	EM 800635	0.11	708.0	23	6436
PI W06	EM 800636	0.11	82.2	23	747
PI W07	EM 800637	0.11	4.3	23	39
PI W08	EM 800638	0.11	1520.0	23	13818
PI W09	EM 800639	0.11	15.0	23	136
PI W10	EM 800640	0.11	50.1	23	455
PI W11	EM 800641	0.11	BDL	23	BDL
PI W12	EM 800642	0.11	BDL	23	BDL
PI W13	EM 800643	0.11	BDL	23	BDL
PI W14	EM 800644	0.11	BDL	23	BDL
PI W15	EM 800645	0.11	BDL	23	BDL

^{*}Calculations Based On A 1 sq.ft. Sample Area Unless Otherwise Noted

96063

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RESERVOIRS ENVIRONMENTAL, INC.

2059 Bryant St., Denver CO 80211

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Phone: (303) 964-1986 Fax: (303) 477-4275 WATS: 1-866-RESI ENV (737-4368)
PAGER: ONCALL Pagor number available at Lab. Atternate Pagers: PLM/TEM 500-2167 PCM/Metals 509-2098 (AFTER HOURS USE ONLY)



Reservoirs Environmental, Inc.

2059 Bryant St. Denver, CO 80211 (303) 964-1986 Fax (303) 477-4275 Toll Free (866) RESI-ENV

REMIT TO: 2059 Bryant St. Denver, CO 80211

Invoice to:

Army National Guard IH - West 3401 Quebec Street, Suite 7200 Denver CO 80207 Invoice Date: August 7, 2003 Invoice Number: 96063-1

TERMS: Net 30 Days

Service Charge of 18% per annum may by charged on past due invoices.

Quantity		Analytical Procedure								
15	RES Job #: Desc: Submitted By: P/O No: Contact: AA/ICP Metal	None given Non-Responsive	Guard IH - West 3-5 Day	4125-02	\$7.50	\$112.50				
15	AAVIOF IVIELAI	Wipe	3-3 Day	4125-02	Φ7.50	φ112.30				

Invoice Total:

\$112.50

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MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX D

NATIONAL GUARD BUREAU REGION NORTH INDUSTRIAL HYGIENE OFFICE ASSESSMENT CRITERIA FOR LEAD

Table 1 Lead Surface Wipe Samples

			Indoor Range Info		nfo			
Wipe Sample #	Armory	City	Active Inactive N/A Cleaned?		Cleaned?	Location of Samples	Conc. (µg/ft²)	
			No			No		
PIW01	Pikesville	Pikesville					Main Drill Floor near Center Exit	BDL
PIW02	Pikesville	Pikesville					Bleacher near classroom #4	BDL
PIW03	Pikesville	Pikesville					Door to Kitchen & Smoking area from armory	26
PIW04	Pikesville	Pikesville					Top of ice maker in canteen area	BDL
PIW05	Pikesville	Pikesville					Former IFR bullet trap floor	6436
PIW06	Pikesville	Pikesville					Former IFR bench near former supply plenum	747
PIW07	Pikesville	Pikesville					Floor one foot outside door to former IFR	39
PIW08	Pikesville	Pikesville					Former IFR under radiator	13818
PIW09	Pikesville	Pikesville					Window sill near room 210	136
PIW10	Pikesville	Pikesville					Window sill in breakroom	455
PIW11	Pikesville	Pikesville					Room 8 (conference area) top of bookcase	BDL
PIW12	Pikesville	Pikesville					Step in Room 8 leading to Chief OPS SGT	BDL
PIW13	Pikesville	Pikesville					Recruitment Office Room 11 top of bookcase	BDL
PIW14	Pikesville	Pikesville					Room 11 top of switch station	BDL
PIW15	Pikesville	Pikesville					Room 21 on floor under fallen light fixture	BDL

Table 1 Lead Surface Wipe Samples

			Indoor Range Info			nfo		
Wipe Sample #	Armory	City	Active	Inactive	N/A	Cleaned?	Location of Samples	Conc. (µg/ft²)
PIW16	Pikesville	Pikesville					Floor in Vault area (Room # 8) second floor	207
PIW17	Pikesville	Pikesville					Floor vault area outside # 11	129
PIW18	Pikesville	Pikesville					Floor vault area near main door	511
PIW19	Pikesville	Pikesville					Window sill of PT area on third floor	238
PIW20	Pikesville	Pikesville					Floor of cage # 307 area third floor	92
PIW21	Pikesville	Pikesville					NCO Club fireplace mantle	BDL
PIW22	Pikesville	Pikesville					Kitchen counter NCO club	BDL
PIW23	Pikesville	Pikesville					Window sill second floor personnel office/ Merson Bldg	BDL
PIW24	Pikesville	Pikesville					Classroom floor corner/Merson Bldg	BDL
PIW25	Pikesville	Pikesville					Behind door to exit in corner of floor of Merson Bldg	BDL

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APPENDIX E

LEAD CLEANING GUIDANCE

HUD TECHNICAL GUIDELINES FOR THE EVALUATION AND CONTROL OF LEAD-BASED PAINT HAZARDS IN HOUSING 1998

May, 2018





CHAPTER 14: CLEANING

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Step-by-Step Summary



Cleaning: How To Do It

- Include step-by-step procedures for precleaning, cleaning during the job, and daily and final cleanings in project design or specifications.
- 2. Assign responsibilities to specific workers for cleaning and for maintaining cleaning equipment.
- 3. Have sufficient cleaning equipment and supplies before beginning work.
- 4. If contamination is extensive, conduct precleaning of the dwelling unit. Move or cover all furniture and other objects.
- Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust.
 Decontamination of all tools, equipment, and worker protection gear is required before it leaves containment areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
- 6. Schedule sufficient time (usually 30 minutes to an hour) for a complete daily cleaning, starting at the same time near the end of each workday after lead hazard control activity has ceased.
- For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
- Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
- Wash all surfaces with a lead-specific detergent, high-phosphate detergent, or other suitable cleaning agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every room is cleaned.
- 10. Repeat step 8. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed (see Chapter 11). Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not overexposed.
- 11. After final cleaning, perform a visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work. This visual examination should be performed by the owner or an owner's representative who is independent of the lead hazard control contractor.
- 12. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after the other construction work has been completed.
- 13. Paint or otherwise seal treated surfaces and interior floors.
- 14. Conduct a clearance examination (see Chapter 15).
- 15. If clearance is not achieved, repeat the final cleaning.



-Step-by-Step Summary (continued) -



- 16. Continue clearance testing and repeated cleaning until the dwelling achieves compliance with all clearance standards. As an incentive to conduct ongoing cleaning and a thorough final cleaning, the cost of repeated cleaning after failing to achieve clearance should be borne by the contractor as a matter of the job specification, not the owner.
- 17. Do not allow residents to enter the work area until cleaning is completed and clearance is established.
- 18. Cleaning equipment list:
 - ♦ HEPA vacuums.
 - Detergent.
 - ♦ Waterproof gloves.
 - Rags.
 - Sponges.
 - Mops.
 - Buckets.
 - ♦ HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs).
 - 6-mil plastic bags.
 - Debris containers.
 - Waste water containers.
 - Shovels.
 - Rakes.
 - Water-misting sprayers.
 - ♦ 6-mil polyethylene sheeting (or equivalent).





Chapter 14: Cleaning

I. Introduction

This chapter describes cleaning procedures to be employed following abatement and interim control work. Dust removal as an interim control measure is covered in Chapter 11.

All lead hazard control activities can produce dangerous quantities of leaded dust. Unless this dust is properly removed, a dwelling unit will be more hazardous after the work is completed than it was originally. Once deposited, leaded dust is difficult to clean effectively. Whenever possible, ongoing and daily cleaning of leaded dust during lead hazard control projects is recommended. Ongoing and daily cleaning is also necessary to minimize worker exposures.

Cleaning is the process of removing visible debris and dust particles too small to be seen by the naked eye. Removal of lead-based paint hazards in a dwelling unit will not make the unit safe unless excessive levels of leaded dust are also removed. This is true regardless of whether the dust was present before or generated by the lead hazard control process itself. Improper cleaning can increase the cost of a project considerably because additional cleaning and clearance sampling will be necessary. However, cleaning and clearance can be achieved routinely if care and diligence are exercised.

A. Performance Standard

Although the cleaning methods described in this chapter are feasible and have been shown to be effective in meeting clearance standards, other methods may also be used if they are safe and effective. This performance-oriented approach should stimulate innovation, reduce cost, and ensure safe conditions for both residents and workers.

B. Small Dust Particles

Dust particles that are invisible to the naked eye remain on surfaces after ordinary cleaning

procedures. A visibly clean surface may contain high and unacceptable levels of dust particles and require special cleaning procedures.

C. Difficulties in Cleaning

While cleaning is an integral and essential component of any lead hazard control activity, it is also the most likely part of the activity to fail.

Several common reasons for this failure include low clearance standards, worker inexperience, high dust-producing methods, and deadlines.

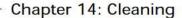
1. Low Clearance Standards

Because very small particles of leaded dust are easily absorbed by the body when ingested or inhaled, a small amount can create a health hazard for young children. Therefore, "clearance standards" are extremely low for acceptable levels of leaded dust particles on surfaces after hazard control activities, and careful cleaning procedures are required. Although it is not possible to remove all leaded dust from a dwelling, it is possible to reduce it to a safe level.

Clearance standards are described more fully in Chapter 15. The permissible amount of leaded dust remaining on each of the following surfaces following lead hazard work is as follows:

- 100 μg/ft² on floors.
- 500 µg/ft² on interior window sills (stools).
- 800 µg/ft² on window troughs (the area where the sash sits when closed).
- 800 μg/ft² on exterior concrete.

These levels are based on wipe sampling.
Clearance testing determines whether the premises or area are clean enough to be reoccupied after the completion of a lead paint hazard control project. A cleaned area may not be reoccupied until compliance with clearance standards has been established. To prevent delays, final testing and final cleaning activities should be coordinated.







2. Worker Inexperience

To understand the level of cleanliness required to meet the established clearance standards for hazard control cleanup, new hazard control personnel often require a significant reorientation to cleaning. Many construction workers are used to cleaning up only dust that they can see, not the invisible dust particles that are also important to remove.

3. High Dust-Producing Methods and/or Inadequate Containment

High dust-generating methods, inadequate containment during hazard control work, and poor work practices can all make achievement of clearance particularly difficult. Work practices necessary to prevent spreading of dust throughout a dwelling (e.g., by tracking dust out of work areas) are essential but sometimes tedious. Essential work practices are sometimes mistakenly considered to be "flexible guidelines" rather than necessary standards that are designed to ensure that the job is completed, not only safely, but also on time and within budget.

4. Deadlines

Daily and final cleanings have sometimes been compromised due to project deadlines, since cleaning comes at the end of the job. Hurried efforts often result in clearance failure. Delayed and over-budget hazard control projects are often the result of repeated, unplanned recleanings that are necessitated by inadequate containment and sloppy work practices.

II. Coordination of Cleaning Activities

A. Checklist

The owner or contractor may use the following cleaning checklist before any lead hazard control activity:

- ✓ Is the critical importance of cleaning in a hazard control project understood?
- ✓ Have all workers been trained and certified for hazard control work?

- ✓ Have the precleaning, daily, and final cleanings been scheduled properly and coordinated with the other participants in the hazard control process?
- ✓ Have cleaning equipment and materials been obtained?
- ✓ Do the workers know how to operate and maintain special cleaning equipment, and do they have directions for the proper use of all cleaning materials?
- ✓ Have all workers carefully studied the step-by-step procedures for precleaning (if needed), in-progress cleaning, and daily and final cleanings?
- ✓ Are all workers properly protected during the cleaning processes (see Chapter9)?
- ✓ Have provisions been made to properly contain and store potentially hazardous debris (see Chapter 10)?
- ✓ Have dust-clearance testing and related visual inspections been arranged (see Chapter 15)?
- ✓ Are the clearance criteria to be met fully understood?
- ✓ Have all appropriate surfaces been properly painted or otherwise sealed?
- ✓ Have appropriate records been maintained that document participants' roles in the hazard control project?

B. Equipment Needed for Cleaning

The following equipment is needed to conduct cleaning: high-efficiency particulate air (HEPA) vacuums and attachments (crevice tools, beater bar for cleaning rugs), detergent, waterproof gloves, rags, sponges, mops, buckets, 6-mil plastic bags, debris containers, waste water containers, shovels, rakes, water-misting sprayers, and 6-mil polyethylene plastic sheeting (or equivalent).

Chapter 14: Cleaning



C. Waste Disposal

Regulations governing hazardous and nonhazardous waste storage, transportation, and disposal affect both the daily and final cleaning procedures. The hazard control contractor and the disposal contractor should work together to establish formal written procedures, specifying selected containers, storage areas, and debris pickups, to ensure that all relevant regulations are met.

III. Cleaning Methods and Procedures

Many of the special cleaning methods and procedures detailed in this chapter are not standard operating procedure for general home improvement contractors. Therefore, project designers, responsible agencies, or owners must ensure that contractors follow the methods and procedures recommended herein or specially designed alternative procedures, even though some may appear to be redundant and unnecessary. These methods have been shown to be feasible and effective in many situations and skipping steps in the cleaning procedures can be counterproductive.

A. Containment

Because of the difficulty involved in the removal of fine dust, dust generated by hazard control work should be contained to the extent possible to the inside of work areas. Inadequately constructed or maintained containment or poor work practices will result in additional cleaning efforts, due to dust that has leaked out or been tracked out of the work area (see Chapter 8).

B. Basic Cleaning Methods: Wet Wash and Vacuum Cleaning Techniques

Because leaded dust adheres tenaciously, especially to such rough or porous materials as weathered or worn wood surfaces and masonry surfaces (particularly concrete), workers should be trained in cleaning methods. As a motivator,

some contractors have awarded bonuses to workers who pass clearance the first time.

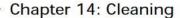
Two basic cleaning methods have proven effective, when used concurrently, in lead-based paint hazard control projects: a special vacuum cleaner equipped with a HEPA exhaust filter, followed by wet washing with special cleaning agents and rinsing, followed by a final pass with the HEPA vacuum.

Although HEPA filtered vacuums and triso-dium phosphate (TSP) cleaners have been considered the standard cleaning tools for lead hazard control projects, new research, discussed under the "Alternatives Methods" section in this chapter, suggests that other tools and products may also be effective in efficiently cleaning dust while providing adequate worker protection from airborne exposure risks. Some of these innovations may even be superior.

1. HEPA Vacuuming

HEPA vacuums differ from conventional vacuums in that they contain high-efficiency filters that are capable of trapping extremely small, micron-sized particles. These filters can remove particles of 0.3 microns or greater from air at 99.97 percent efficiency or greater. (A micron is 1 millionth of a meter, or about 0.00004 inches.) Some vacuums are equipped with an ultra-low penetration air (ULPA) filter that is capable of filtering out particles of 0.13 microns or greater at 99.9995 percent efficiency. However, these ULPA filters are slightly more expensive, and may be less available than HEPA filters.

Vacuuming with conventional vacuum machines is unlikely to be effective, because much of the fine dust will be exhausted back into the environment where it can settle on surfaces. A recent Canadian study revealed that finedust air levels were exceedingly high when a standard portable vacuum with a new bag was used, although partially filled bags were found to be more efficient (CMHC, 1992). Considerations for the proper use of a HEPA vacuum are listed below.







Operating Instructions

There are a numerous manufacturers of HEPA vacuums. Although all HEPA vacuums operate on the same general principle, they may vary considerably with respect to specific procedures, such as how to change the filters. To ensure the proper use of equipment, the manufacturer's operating instructions should be carefully followed and if possible, training sessions arranged with the manufacturer's representative.

Although HEPA vacuums have the same "suction" capacity as ordinary vacuums that are comparably sized, their filters are more efficient. Improper cleaning or changing of HEPA filters may reduce the vacuum's suction capability.

Special Attachments

Because the HEPA vacuum will be used to vacuum surfaces other than floors, operators should buy attachments and appropriate tool kits for use on different surfaces—such as brushes of various sizes, crevice tools, and angular tools.

Selecting Appropriate Size(s)

HEPA vacuums are available in numerous sizes, ranging from a small lunchbucket-sized unit to track-mounted systems. Two criteria for size selection are the size of the job and the type of electrical power available. Manufacturer recommendations should be followed.

Wet-Dry HEPA Vacuums

Some hazard control contractors have found the wet-dry HEPA vacuums to be particularly effective in meeting clearance standards. These vacuums are equipped with a special shut-off float switch to protect the electrical motor from water contact.

Prefilters

HEPA filters are usually used in conjunction with a prefilter or series of prefilters that trap the bulk of the dust in the exhaust airstream, particularly the larger particles. The HEPA filter traps most of the remaining small particles that have passed through the prefilter(s). All filters must be maintained and replaced or

cleaned as specified in the manufacturer's instructions. Failure to do so may cause a reduction in suction power (thus reducing the vacuum's efficiency and effectiveness). Failure to change prefilters may damage the vacuum motor and will also shorten the service life of the HEPA filter, which is far more expensive than the prefilters.

HEPA Vacuuming Procedures

Surfaces frequently vacuumed include ceilings, walls, floors, windows, interior and exterior sills, doors, heating, ventilation, and air conditioning (HVAC) equipment (heating diffusers, radiators, pipes, vents), fixtures of any kind (light, bathroom, kitchen), built-in cabinets, and appliances.

To aid in dislodging and collecting deep dust and lead from carpets, the HEPA vacuum must be equipped with a beater bar (agitator head) that is fixed to the cleaning head. This bar should be used on all passes on the carpet face during dry vacuuming (see Chapter 11 for details on carpet and furniture cleaning).

All rooms and surfaces should be included in the HEPA vacuum process, except for those that (1) were found not to have lead-paint hazards and were properly separated from work areas before the process began (see Chapter 8), or (2) were never entered during the process. Porches, sidewalks, driveways, and other exterior surfaces should be vacuumed if exterior hazard control work was conducted, or if debris was stored or dropped outside. Vacuuming should begin on the ceilings and end on the floors, sequenced to avoid passing through rooms already cleaned, with the dwellings' entryway cleaned last.

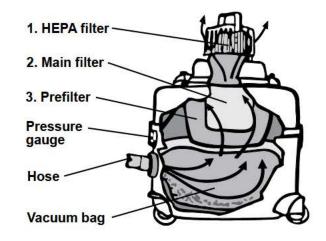
Emptying the HEPA Vacuum

Used filters and vacuumed debris are potentially hazardous waste and should be treated accordingly (see Chapter10). Therefore, operators should use extreme caution when opening the HEPA vacuum for filter replacement or debris removal to avoid accidental release of accumulated dust into the environment. This may occur, for example, if the vacuum's seal has been broken and the vacuum's bag is disturbed.





Figure 14.1a Vacuum With a HEPA Filter.



Parts of a HEPA-vacuum

Most HEPA-vacuums have three filters: HEPA filter, main filter, and prefilter. Debris gets sucked in through the hose into the vacuum bag. The air and dust get filtered through the prefilter, the main filter, and the HEPA filter. The HEPA filter captures the lead dust before the air is released into the work area again.

Operators should also wear a full set of protective clothing and equipment, including appropriate respirators, when performing this maintenance function, which should be done in the containment area or offsite.

2. Wet Detergent Wash

Several types of detergents have been used to remove leaded dust. Those with a highphosphate content (containing at least 5 percent trisodium phosphate, also known as TSP) have been found to be effective when used as part of the final cleaning process (Milar, 1982). TSP detergents are thought to work by coating the surface of dusts with phosphate or polyphosphate groups which reduces electrostatic interactions with other surfaces and thereby permits easier removal. Because of environmental concerns some States have restricted the use of TSP, and some manufacturers have eliminated phosphates from their household detergents. However, high-TSP detergents can usually be found in hardware stores and may be permitted for limited use, such as lead hazard control.

Other non-TSP cleaning agents developed specifically for removing leaded dust have also been found to be effective (possibly more effective than TSP) in limited trials by several

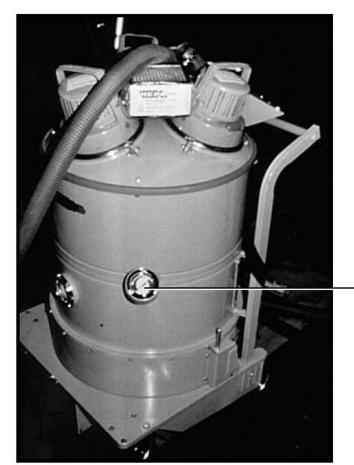


Figure 14.1b Pressure Gauge Indicator Shows When Filters Require Changing.

Pressure

gauge





Figure 14.2 HEPA Vacuum Sizes and Tools.

investigators (Grawe, 1993; Wilson, 1993) and may also be safer, since TSP is a skin and eye irritant. See section VII for more information on non-TSP detergents. Proper procedures for using high-phosphate detergents also apply to most other types of detergents and include the following steps:

Manufacturer's Dilution Instructions

Users of cleaning agents for leaded dust removal should follow manufacturer's instructions for the proper use of a product, especially the recommended dilution ratio. Even diluted, trisodium phosphate is a skin irritant and users should wear waterproof gloves. Eye protection should also be worn, and portable eyewash facilities should be located in or very near the work area. Consult manufacturer's directions for the use of other detergents.

Appropriate Cleaning Equipment

Because a detergent may be used to clean leaded dust from a variety of surfaces, several types of application equipment are needed, including cleaning solution spray bottles, wringer buckets, mops, variously sized hand sponges, brushes, and rags. Using the proper equipment on each surface is essential to the quality of the wetwash process.

Proper Wet-Cleaning Procedures

At the conclusion of the active lead hazard control process and the initial HEPA vacuuming, all vacuumed surfaces should be thoroughly and completely washed with a high-phosphate solution or other lead-specific cleaning agent (or equivalent) and rinsed. Select a detergent that does not damage existing surface finishes (TSP may damage some finishes). Work should proceed from ceilings to floors and sequenced to avoid passing through rooms already cleaned.

Changing Cleaning Mixture

Many manufacturers of cleaners will indicate the surface area that their cleaning mixture will cover. To avoid recontaminating an area by cleaning it with dirty water, users should follow manufacturer-specified surface-area limits. However, regardless of manufacturers' recommendations, the cleaning mixture should be changed after its use for each room. As a rule of thumb, 5 gallons should be used to clean no

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Figure 14.3 Goggles, Face Shields, Gloves, and Eye Wash Facilities Should Be Available When Used With Chemicals Such as TSP. EMERGENCY EYE WASH STATION Latex Neoprene Nitrile

more than 1,000 square feet. Used cleaning mixture is potentially hazardous waste (see Chapter 10); consult with your local water and sewage utility for directions on its proper disposal. Wash water should never be poured onto the ground. The wash water is usually filtered and then poured down a toilet (if the local water authority approves).

3. The HEPA/Wet Wash/HEPA Cycle

Typical Procedures

The usual cleaning cycle that follows lead hazard control activities is called the HEPA vacuum/wet wash/HEPA cycle and is applied to an entire affected area as follows:

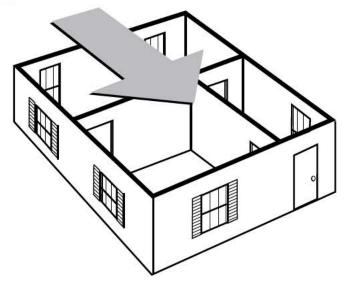
First, the area is HEPA vacuumed.



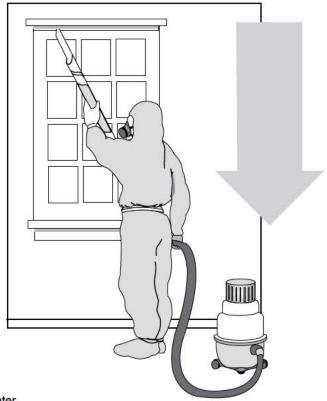


Figure 14.4a The HEPA Vacuum, Wet Wash, HEPA Vacuum Cycle Helps in Meeting Clearance Standards.

HEPA vacuum all surfaces Start at the end farthest from the main entrance/exit. As you vacuum, move towards the main exit and finish there.



Begin at the top of each room and work down. For example, start with the top shelves, the top of the woodwork, and so on, and work down to the floor. Do every inch of the windows, especially the window troughs.



Courtesy: Alice Hamilton Occupational Health Center



Chapter 14: Cleaning



- Next, the area is washed down.
- After drying, the area is again HEPA vacuumed.

The rationale for this three-pass system is as follows:

- The first HEPA vacuum removes as much dust and remaining debris as possible.
- The wet wash further dislodges dust from surfaces.
- The final HEPA cycle removes any remaining particles dislodged but not removed by the wet wash.

Single-Pass Wet Wash/HEPA Vacuum

Some lead hazard control contractors have found HEPA spray cleaner vacuums to be a cost-effective alternative to the three-pass system. Similar to home carpet-cleaning machines, these vacuums simultaneously deliver a solution to the surface and recover the dirty solution. Theoretically, this process combines two of the steps in the HEPA vacuum/wet wash/HEPA cycle into one step. While anecdotal evidence indicates that the spray cleaner wet wash/HEPA is effective for some uses, limitations have been noted in its use for ceilings, vertical surfaces, and hard to reach areas. This device may be used as long as clearance standards are met.

Figure 14.4b (continued)

Use special attachments

Use the rubber cone where the floor meets the baseboard and along all the cracks in the floor boards. Use the brush tool for walls and woodwork.

Use the wheeled floor nozzle for bare floors and the carpet beater for rugs.

Move slowly

Vacuum slowly so the HEPA vacuum can pick up all the lead dust.



Rubber Cone

Dust Brush



Powered Carpet Beater



Wheeled Floor Nozzle





Figure 14.4c (continued)

Wash all surfaces with suitable detergents

Wash all surfaces in the work area with suitable detergents, including areas that had been covered with plastic. Some wallpaper should only be HEPA vacuumed, since it may be damaged by the detergent.



Wipe All Surfaces



Wet Mop Floor



Don't Dry Sweep





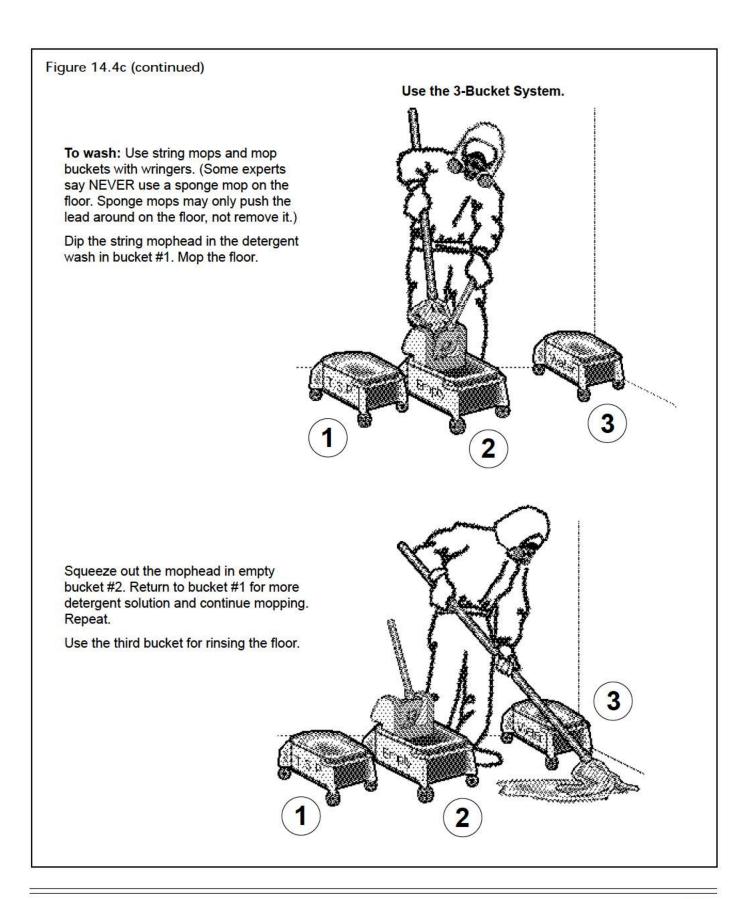


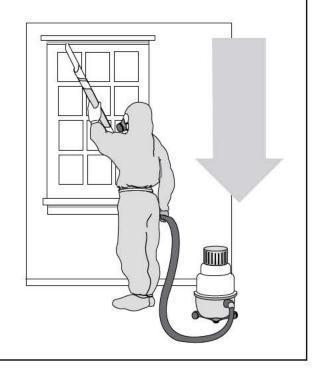




Figure 14.4d (continued)

HEPA vacuum all surfaces a final time HEPA vacuum *all surfaces* in the work area, including areas that had been covered with plastic.

Starting at the far end, work towards the decontamination area. Begin with ceilings or the top of the walls and work down, cleaning the floors last. Do every inch of the windows, especially the troughs. Use the corner tool to clean where the floor meets the baseboard and all the cracks in the floor boards. Use the brush tool for the walls. Move slowly and carefully to get all the dust.



4. Sealing Floors

Before clearance, all floors without an intact, nonporous coating should be coated. Sealed surfaces are easier for residents to clean and maintain over time than those that are not sealed. Wooden floors should be sealed with a clear polyurethane or painted with deck enamel or durable paint. Vinyl tile, linoleum, and other similar floors should be sealed with an appropriate wax. Concrete floors should be sealed with a concrete sealer or other type of concrete deck enamel. However, if these floors are already covered by an effective coat of sealant, it may be possible to skip this step.

As an alternative to sealing, floors may be covered with new vinyl tile, sheet vinyl, linoleum flooring, or the equivalent to create a more permanent cleanable surface. New surfaces should be cleaned with a cleaning solution that is appropriate for that type of surface.

IV. Order of Cleaning Procedures During Lead Hazard Control

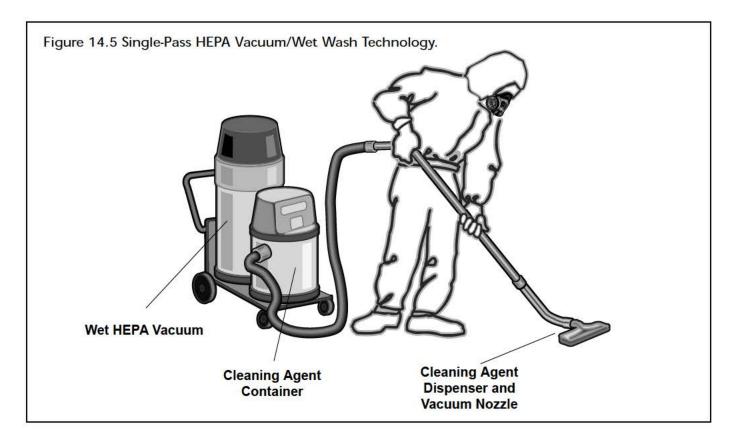
The special cleaning procedures to be followed during a lead-based paint hazard control project are discussed in chronological order below. Skipping steps in the process may result in failure to meet post-lead hazard control clearance standards.

A. Precleaning Procedures

Precleaning (i.e., cleaning conducted before lead hazard control is begun) is necessary only in dwelling units that are heavily contaminated with paint chips. Precleaning involves the removal of large debris and paint chips, followed by HEPA vacuuming. These steps may be followed by removal of occupant personal possessions, furniture, or carpeting, depending on the





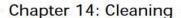


Worksite Preparation Level selected (see Chapter 8). If the furniture will not be cleaned, it should be removed from the area or covered with plastic prior to beginning the precleaning procedure. Carpeting should always be misted before its removal to control the generation of hazardous dust.

It is usually the resident's responsibility to remove most of his or her personal possessions. However, if necessary, owners or project management should be prepared to complete this activity before lead hazard control work begins. As a last resort, the contractor may pack any remaining belongings and carefully seal and move the boxes, supplying all necessary boxes, packing materials, and staff to complete the task. Following cleaning and clearance, the contractor should return all packed items to their appropriate places. Leaving these tasks to the contractor may be expensive and inefficient, since the contractor will need to be insured for this function if the occupant's



Figure 14.6 Precleaning Is Needed in Areas Where Contamination and Deterioration Are High.





belongings are damaged. Additionally, moving furniture, rugs, drapes, and other items owned by the occupant could increase leaded dust levels. Clearance should be conducted after cleaning but before resident items are moved back in.

B. Ongoing Cleaning During the Job

Periodic HEPA vacuuming during the lead hazard control work may be necessary to minimize tracking of dust and paint chips from one area to another (e.g., when a large amount of paint chips or dust is being generated).

C. Daily Cleaning Procedures

Cleaning activity should be scheduled at the end of each workday when all active lead hazard control throughout the dwelling has ceased. Sufficient time must be allowed for a thorough and complete cleaning (usually about 30 minutes to an hour). Daily cleaning helps achieve clearance dust levels by minimizing problems that may otherwise occur during final cleaning and limiting worker exposures. While daily cleaning can be skipped in vacant dwelling units, it is required when occupants will



Figure 14.7 Plastic Sheeting Should Be Repaired as Part of Daily Cleanup.

return in the evening. Under no circumstances should debris or plastic be left outside overnight in an unsecured area, even if the dwelling is vacant. Daily cleaning should consist of:

- Removing large debris.
- Removing small debris.
- HEPA vacuuming, wet clean, HEPA vacuuming (horizontal surfaces only).
- Cleaning exterior.
- Patching and repairing plastic sheeting.
- Securing debris/plastic.

1. Large Debris

Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to a secure area on the property designated for waste storage. All sharp corners, edges, and nails should be hammered down to prevent injury and minimize the tearing of plastic. It is not necessary to wrap each individual piece of debris in plastic if the entire load can be wrapped. A secure area either outside or inside the property must be designated as a temporary waste-storage area. Covered, secured, and labeled dumpsters placed on or near the property may be used. Proper segregation of waste should be enforced at this time (see Chapter 10).

2. Small Debris

After being misted with water, small debris should be swept up, collected, and disposed of properly. The swept debris should be placed in double 4-mil or single 6-mil polyethylene (or equivalent) plastic bags, properly sealed, and moved to the designated trash storage area. Trash bags should not be overloaded; overloaded bags may rupture or puncture during handling and transport.

3. Exterior Cleaning

Areas potentially affected by exterior lead hazard control should be protected via a containment system (see Chapter 8). Because weather can adversely affect the efficacy of exterior



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containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleaning, the immediate area should be examined visually to ensure that no debris has escaped containment. Any such debris should be raked or vacuumed and placed in single 6-mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris. HEPA vacuuming is appropriate for hard exterior surfaces, not soil.

4. Worker Protection Measures

General worker protection measures are discussed in Chapter 9. Studies indicate that during daily cleaning activities, especially while wet sweeping, workers may be exposed to high levels of airborne dust. Therefore, workers should wear protective clothing and equipment, especially appropriate respirators.

5. Maintaining Containment

The integrity of the plastic sheeting used in a lead hazard control project must be maintained. During their daily cleaning activities, workers should monitor the sheeting and immediately repair any holes or rips with 6-mil plastic and duct tape.

V. Order of Final Cleaning Procedures After Lead Hazard Control

Before treated surfaces can be painted or sealed, final cleaning procedures must be completed. Because airborne dust requires time to settle, the final cleaning process should start no sooner than 1 hour after active lead hazard control has ceased in the room. See Appendix 11 for details regarding dust settling.

A. Final Cleaning

As the first stage in the final cleaning, floor plastic should be misted and swept as detailed earlier in this chapter. Upper-level plastic, such as that on cabinets and counters, should be removed first, after it has been misted with water and cleaned. All plastic should be folded

carefully from the corners/ends to the middle to trap any remaining dust. Next, remove both layers of plastic from the floor.

Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after the cleaning and removal of other plastic sheeting; these sheets may then be misted, cleaned, and removed last.

Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plastic-removal process usually requires workers to use protective clothing and respirators.

After the plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle, starting with the ceiling and working down to the floor. After surfaces are repainted or sealed, a final HEPA/wet wash/HEPA cycle may be necessary if accumulated dust caused by other work is visible.

1. Decontamination of Workers, Supplies, and Equipment

Decontamination is necessary to ensure that worker's families, other workers, and subsequent properties do not become contaminated. Specific procedures for proper decontamination of equipment, tools, and materials prior to their removal from lead hazard control containment areas should be implemented, as described below and in Chapters 9 and 10.

Work clothing, work shoes, and tools should not be placed in a worker's automobile unless they have been laundered or placed in sealed bags. All vacuums and tools that were used should be wiped down using sponges or rags with detergent solutions.

Consumable/disposable supplies, such as mop heads, sponges, and rags, should be replaced, after each dwelling is completed. Soiled items should be treated as contaminated debris (see Chapter 10).







Figure 14.8a Pick Up Corners of Plastic Sheeting.



Figure 14.8b Fold Plastic Inward.

Durable equipment, such as power and hand tools, generators, and vehicles, should be cleaned prior to their removal from the site; the cleaning should consist of a thorough HEPA vacuuming followed by washing.

B. Preliminary Visual Examination

After the preliminary final cleaning effort is completed, the certified supervisor should visually evaluate the entire work area to ensure that all work has been completed and all visible dust and debris have been removed. While the preliminary examination may be performed by the lead hazard control supervisor, contractor, or owner as a preparatory step before the final clearance examination, it does not replace the independent visual assessment conducted during clearance.

If the visual examination results are unsatisfactory, affected surfaces must be retreated and/or recleaned. Therefore, it is more cost effective to have the supervisor rather than the clearance examiner perform this initial examination.

C. Surface Painting or Sealing of Nonfloor Surfaces

The next step of the cleaning process is painting or otherwise sealing all treated surfaces except floors.

Surfaces, including walls, ceilings, and woodwork, should be coated with an appropriate primer and repainted. Surfaces enclosed with vinyl, aluminum coil stock, and other materials traditionally not repainted are exempt from the painting provision.

D. Final Inspection

The final clearance evaluation should take place at least 1 hour after the final cleaning. Clearance has three purposes: 1) to ensure that the lead hazard control work is complete, 2) to detect the presence of leaded dust, and 3) to make sure that all treated surfaces have been repainted or otherwise sealed. Clearance is usually performed after the sealant is applied to the floor. See Chapter 15 for information on clearance examination procedures.

E. Recleaning After Clearance Failure

If after passing the final visual examination, the dwelling unit fails the clearance wipe dust tests,





the HEPA/wet wash/HEPA cleaning cycle should be carefully and methodically repeated. Failure is an indication that the cleaning has not been successful. Recleaning should be conducted under the direct supervision of a certified supervisor. Care should be exercised during the recleaning of "failed" surfaces or components to avoid recontaminating "cleared" surfaces or components.

VI. Cleaning Cost Considerations

An important consideration in determining lead hazard control strategies and methods is the cost and difficulty of required daily and final cleanup operations and the ease with which one can meet dust-clearance standards. A general rule of thumb is that lead hazard control strategies that generate the most dust will have higher cleanup costs and higher initial clearance test-failure rates.

A. Initial Clearance Test Failure Rates

The likelihood of passing final dust-clearance tests is highly correlated with the chosen intervention strategy, methods, and care exercised by the contractor. For example, in one study (HUD, 1991) initial wipe-test failure rates were 14 percent for interior window sills, 19 percent for floors, and 33 percent for window troughs. The pass/fail rates for each surface were strongly associated with the dwelling unit abatement strategy employed. Chemical removal and hand-scraping strategies experi-enced higher failure rates than replacement and encapsulation/enclosure strategies (see Table 14.1).

However, results of the HUD demonstration project indicated that clearance failure is not solely related to abatement method. The report stated that "the diligence and effectiveness of an abatement contractor's cleaning process ... had a major impact on ... the likelihood of the dwelling unit to pass the final wipe test clearance" (HUD, 1991).



Figure 14.8c Dispose of Plastic Sheeting in a Plastic Trash Bag.

B. Key Factors In Effective Cleaning

Effective cleaning will be aided by adequate sealing of surfaces with polyethylene sheeting prior to lead hazard control, proper daily cleaning practices, good worker training, and attention to detail. Where poor worksite preparation is employed, additional cleaning may be required to meet clearance.

C. Special Problems

Surfaces such as porous concrete, old porous hardwood floors, and areas such as corners of rooms and window troughs pose especially difficult cleaning challenges. Porous concrete and corners of rooms normally require additional vacuuming to achieve an acceptable level of cleanliness.

The lead hazard control strategy of enclosure is frequently chosen for window troughs and for old porous hardwood floors due to the difficulty of adequately cleaning these surfaces. This





option provides not only a clean surface but a more permanently cleanable surface for dwelling occupants to maintain.

VII. Alternative Methods

Alternatives to the recommended cleaning tools and practices discussed in this chapter are available, some having significant potential for increasing effectiveness and lowering costs.

A recent Canadian study (CMHC, 1992) evaluated the effectiveness of contaminated dust cleanup activities using tools that would generally be available to construction contractors and homeowners. Vinyl flooring and carpeting were cleaned using several wet/dry vacuuming systems, sweeping, and wet mopping. The study found that regular vacuums with empty bags send a steady stream of fine particles into the air, while vacuums with partially filled bags were more efficient. This finding suggests the necessity for HEPA vacuums. Other vacuums may be used if workers do not experience increased exposures, if compliance with clearance standards is achieved, and if a variance from OSHA regulation (29 CFR 1926.62 (h)(4)) is obtained by the contractor or employer (if required).

Agitator heads on vacuums were demonstrated to significantly enhance vacuum effectiveness on carpets in cleaning up fine dust without

increasing airborne dust levels. Table 14.2 suggests that a central vacuum with an agitator head is most efficient at removing dust and minimizing recontamination, probably because the vacuum exhaust is blown away from living areas. Because many houses do not have central vacuuming systems, a portable HEPA vacuum is the next best choice (see Table 14.2). Vacuums without agitator heads appeared to perform relatively poorly on carpets.

A. Vacuums

Regular (non-HEPA) dry vacuums potentially produce hazardous levels of airborne dust and therefore should be avoided. Externally exhausted vacuum units with adequate dustretaining capability may be used. The OSHA lead standard requires the use of HEPA vacuum equipment (see 29 CFR 1926.62 (h)(4), which states, "where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters").

B. Trisodium Phosphate and Other Detergents

TSP detergents have been used successfully for a number of years in lead hazard control work. However, in recent years, other new cleaning agents have been developed specifically for leaded dust removal. The need for alternatives has been fueled by the fact that TSP is an eye

Table 14.1 Initial Cleaning Wipe-Test Failure Rates for Various Abatement Strategies

Dust Test Location	Hand Scrape w/Heat Gun	Chemical Removal	Enclosure	Encapsulation	Replacement	All Methods
Floors	28.8%	22.7%	20.0%	13.8%	12.5%	19%
Sills	24.4%	24.1%	8.2%	4.8%	17.4%	14%
Wells	44.5%	45.7%	23.7%	25.7%	21.0%	33%

Source: U.S. Department of Housing and Urban Development (August 1991) The HUD Lead-Based Paint Abatement Demonstration (FHA)



Chapter 14: Cleaning



and skin irritant and is increasingly restricted from household use and unavailable in many local jurisdictions. TSP also damages some finishes. Recently reported trials of two new products suggest that alternative lead-specific cleaning agents may be more effective and safer than TSP (Grawe, 1993; Wilson, 1993).

These Guidelines do not prohibit the use of non-TSP cleaning agents. HUD encourages further evaluation of alternative cleaning methods. Use of any cleaning agent that results in compliance with clearance criteria is encouraged.

Table 14.2 Mass Removal Efficiency for Extended Vacuuming Cycles

	Mass Removal Efficiency Percentages Cleaning Method					
Cycle Number						
	Central Vacuum—Plain Tool	Central Vacuum—Agitator Head	HEPA Vacuum	Portable Vacuum—Plain Tool		
1	34.7	71.0	55.4	17.5		
2	47.0	80.2	61.2	23.0		
3	51.9	85.9	66.3	26.6		
4	56.0	87.8	67.0	29.4		
5	59.3	88.9	72.1	32.5		
6	61.6	91.2	74.4	34.9		
7	63.8	93.1	76.4	36.5		
8	67.5	95.4	77.5	38.1		
9	67.5	97.7	78.7	40.1		
10	67.2	100.0	80.2	41.7		
11		102.3	80.2	41.7		
12		104.6	84.1	44.8		
13		104.6	84.5	46.8		
14		103.8	84.5	48.4		
15				49.6		
16				50.8		
17				52.4		
18				53.6		
19				54.4		
20				55.2		

Source: Canada Mortgage and Housing Corporation: Saskatchewan Research Council (December 1992) Effectiveness of Clean-up Techniques for Leaded Paint Dust

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MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX F

MOLD GUIDANCE

Army Facilities Management Information Document on Mold Remediation Issues

TG 277 FEBRUARY 2002



ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

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ARMY FACILITIES MANAGEMENT INFORMATION DOCUMENT ON MOLD REMEDIATION ISSUES

Moisture Control: The Army Way to Mold Prevention!

INTRODUCTION

Concern about indoor exposure to mold has been increasing as the public becomes more aware that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions.

This document provides the best and most current guidance for remediation of clean water damage (<48 hours) and mold contamination (>48 hours) into one resourceful Army guide. This guide has been designed to provide information to facilities management individuals who have little or no experience with mold remediation. It will assist them in making a reasonable judgment as to whether the situation can be handled in-house. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor. If an outside contractor is employed, they must have experience cleaning up mold. Check their references, and have them follow the recommendations presented in this document, EPA guidelines, and/or guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH). A multi-disciplinary team approach to mold concerns is best. A health and safety professional, such as an industrial hygienist, should be consulted prior to any remediation activities to assist in the project.

Molds produce tiny spores to reproduce. Mold spores float through the indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting whatever they are growing on in order to survive. There are molds that can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.(1)

In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur. Any initial water infiltration should be stopped and clean up began immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. (Refer to Appendix A for detailed guidance on clean water damage response). If the source of water is elevated humidity, actions to maintain the relative humidity levels below 60% to inhibit mold growth should be taken (2). Emphasis should be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

May, 2018

MOLD PREVENTION TIPS:

[Adapted from EPA, reference 1]

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilating, and air-conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

REMEDIATION PLANNING

- Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Select cleanup methods for moldy items (Appendix B)
- Select Personal Protection Equipment (PPE)- protect remediators (Appendix B)
- Select containment equipment protect building occupants (Appendix B)
- Select remediation personnel who have the experience and training needed to implement the remediation plan and use PPE and containment as appropriate

REMEDIATE MOISTURE AND MOLD PROBLEMS

- Fix moisture problem, implement repair plan and/or maintenance plan
- Dry wet, non-moldy materials within 48 hours to prevent mold growth (Appendix A)
- Clean and dry moldy materials (Appendix B)
- Discard moldy porous items that can't be cleaned (Appendix B)

REMEDIATION PROCEDURES

Four levels of abatement are described below. The size of the area impacted by mold contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of mold and preventing dust contaminated with mold from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. (3)

Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning should be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination should be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. All materials to be reused should be dry and visibly free from mold. Routine inspections should be conducted to confirm the effectiveness of remediation work. (1 and 3)

The use of bleach or other biocides is questionable in most cases (8). The effectiveness of bleach in reducing living mold is dependent on concentration, residual chlorine levels, and contact time on the surface (8). All of these factors are difficult to control during remediation. Removal of all mold growth can generally be accomplished by physical removal of materials supporting active growth and thorough cleaning of non-porous materials (4). Therefore, application of a biocide serves no purpose that could not be accomplished with a detergent or cleaning agent (4).

The use of gaseous ozone or chlorine dioxide for remedial purposes is **not** recommended. Both compounds are highly toxic and contamination of occupied space may pose a health threat. Furthermore, the effectiveness of these treatments is unproven. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."(4)

FOUR REMEDIATION LEVELS

[Adapted from NYCDOH Guidelines on Assessment and Remediation of Fungi in Indoor Environments (3) and EPA (1)]

Level I: Small Isolated Areas – Total surface area affected less than 10 square **feet** - e.g., ceiling tiles, small areas on walls. Refer to Appendix B for detailed guidance.

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Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas used by remediation workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Level II: Medium – Total Surface Area affected between 10 and 100 square feet - e.g., several wallboard panels. (See Appendix B for detailed guidance).

The following procedures at a minimum are recommended:

Refer to Appendix C for proper PPE selection. Limited or Full protection may be required depending on the situation.

Refer to Appendix D for Containment procedures.

The work area and areas directly adjacent should be covered with a single layer of 6 mil fire-retardant polyethylene sheet(s) and taped before remediation, to contain dust/debris.

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Seal ventilation ducts/grills in the work area and areas directly adjacent with 6 mil polyethylene sheeting. Use an exhaust fan with a High Efficiency Particulate Air (HEPA) filter to generate negative pressurization.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and surrounding areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level III be followed.

Level III: Large Area – Total Surface Area affected greater than 100 square feet or potential for increased occupant or remediator exposure during remediation is estimated to be significant. (See Appendix B for detailed guidance).

The following procedures are recommended:

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from occupied spaces using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air(4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If any remediation sampling is deemed necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

Level IV: Remediation of HVAC Systems (See Appendix B for detailed guidance. For a small area (<10 ft²) follow Level I guidance for PPE and containment and for a areas (>10 ft²) follow Medium (Level II) or when greater than 100 ft² follow Large (Level III) guidance for PPE and containment as discussed in Appendices B, C, and D)

A Small Isolated Area of Contamination (total surface area affected <10 square feet) in the HVAC System

The HVAC system should be shut down prior to any remedial activities.

Regular building maintenance staff can conduct this level of remediation. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See Appendix C for PPE guidance. Respiratory protection (e.g., N95 disposable respirator), used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended (7). Gloves and goggles should be worn. All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional.

The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and double-bagged in 6-mil plastic bags and removed. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

All areas should be left dry and visibly free from contamination and debris.

Areas of Contamination (Total surface area affected >10 square feet) in the HVAC System

The following procedures are recommended:

The HVAC system should be shut down prior to any remedial activities.

Refer to Appendices C & D for PPE and Containment guidance.

Completely isolate the work area from other areas. Isolate the HVAC system using double layers of polyethylene plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings).

Utilize an exhaust fan with a HEPA filter to generate negative pressurization. Provide airlocks and a decontamination room.

Growth supporting materials that are contaminated, such as the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be sealed and removed in double-bagged 6-mil plastic. When a decontamination room is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. Since there are no special disposal requirements for moldy materials, they can be discarded as ordinary construction waste.

The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

All areas should be left dry and visibly free from contamination and debris.

Pre- and post-remediation sampling may also be useful in determining whether remediation efforts have been effective. After remediation, the types and concentrations of mold in the indoor air samples should be similar to what is found in the local outdoor air (4). Since no Federal limits have been set for mold or mold spores, sampling cannot be used to check a building's compliance with Federal mold standards.

If remediation sampling is necessary contact your local industrial hygiene office or contact safety and health professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results. Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HAZARD COMMUNICATION

When mold growth requiring Level III or IV (large-scale) remediation is found, the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners (1 and 3).

CONCLUSION

In summary, the prompt remediation of contaminated material and infrastructure repair must be the primary response to mold contamination in buildings. The simplest and most expedient remediation that properly and safely removes mold growth from buildings should be used. Widespread contamination poses much larger problems that must be addressed on a case-by-case basis in consultation with a health and safety specialist. Effective communication with building occupants is an essential component of all remedial efforts. Individuals with persistent health problems should go to the local occupational health clinic or see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures.

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- 1. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
- 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Ventilation for Acceptable Indoor Air Quality ASHRAE Standard (ANSI/ASHRAE 62-2001). Atlanta, Georgia, 2001.
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- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

Water Damage Cleanup and Mold Prevention

Appendix A presents strategies to respond to water damage within 24-48 hours. These guidelines are designed to help avoid the need for remediation of mold growth by taking quick action before growth starts. If mold growth is found on the materials listed in Appendix A, refer to Appendix B for guidance on remediation. Depending on the size of the area involved and resources available, professional assistance may be needed to dry an area quickly and thoroughly.

Water D	amage - Cleanup and Mold Prevention
Guidelines for Response to Mold Growth£	Clean Water Damage within 24-48 Hours to Prevent
Water-Damaged Material†	Actions
Books and papers	 For non-valuable items, discard books and papers. Photocopy valuable/important items, discard originals. Freeze (in frost-free freezer or meat locker) or freeze-dry.
Carpet and backing - dry within 24-48 hours§	 Remove water with water extraction vacuum. Reduce ambient humidity levels with dehumidifier. Accelerate drying process with fans.
Ceiling tiles	Discard and replace.
Cellulose insulation	Discard and replace.
Concrete or cinder block surfaces	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters.
Fiberglass insulation	Discard and replace.

Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	 Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. Check to make sure under flooring is dry; dry under flooring if necessary.
Non-porous, hard surfaces (Plastics, metals)	Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.
Upholstered furniture	 Remove water with water extraction vacuum. Accelerate drying process with dehumidifiers, fans, and/or heaters. May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture.
Wallboard (Drywall and gypsum board)	 May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible.
Window drapes	Follow laundering or cleaning instructions recommended by the manufacturer.
Wood surfaces	 Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. Wet paneling should be pried away from wall for drying

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£ If mold growth has occurred or materials have been wet for more than 48 hours, consult Appendix B. Even if materials are dried within 48 hours, mold growth may have occurred. Professionals may test items if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.

These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then OSHA may have requirements for Personal Protective Equipment and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

- † If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.
- § The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*				
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment	
SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)				
Books and papers	3			
Carpet and backing	1, 3			
Concrete or cinder block	1, 3	Minimum N-95 respirator, gloves, and goggles		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3			
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		None required	
Upholstered furniture & drapes	1, 3			
Wallboard (drywall and gypsum board)	3			
Wood surfaces	1, 2, 3			

	MEDIUM - Tot	tal Surface Area Affected Between 10 and 1	100 ft ²
Books and papers	3		
Carpet and backing	1,3,4		
Concrete or cinder block	1,3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area
Non-porous, hard surfaces (plastics, metals)	1,2,3		
Upholstered furniture & drapes	1,3,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3		
		ce Area Affected Greater Than 100 ft ² or F iator Exposure During Remediation Estim	
Books and papers	3		
Carpet and backing	1,3,4		
Concrete or cinder block	1,3	Full	Full
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider potential for remediator/occupant exposure	Use professional judgment, consider potential for remediator exposure and
Non-porous, hard surfaces (plastics, metals)	1,2,3	and size of contaminated area	size of contaminated area
Upholstered furniture & drapes	1,2,4		
Wallboard (drywall and gypsum board)	3,4		

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. Consult Appendix A if materials have been wet for less than 48 hours, and mold growth is not apparent. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Wood surfaces

1,2,3,4

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

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Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above

the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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Industrial Hygiene/ Preventive Medicine Mold Assessment Guide

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Industrial Hygiene/Preventive Medicine Mold Assessment Guide

Introduction

The USACHPPM Industrial Hygiene Field Services Program receives requests from industrial hygiene (IH)/preventive medicine (PM) field personnel for information about mold investigations and clean-up procedures. Like all organisms, molds have an absolute requirement for water. The types of mold and their abundance in an area depend on the availability of nutrients (i.e., dirt), water and temperature. Chronic water intrusion, lack of adequate ventilation and moisture control, and or isolated floods, such as a water pipe bursting, are typical conditions, which lead to mold growth in buildings.

When mold growth is present, the removal and cleaning of contaminated materials must be handled with proper precautions, because disturbing this growth can result in bioaerosol release, i.e., sending millions of spores into the air.

This mold assessment guide used in conjunction with the *ARMY Facilities Management Information Document on Mold Remediation Issues* (*TG 277*)¹ will assist Industrial Hygienists and or Preventive Medicine personnel in conducting mold investigations. Since a team approach is recommended, the collaboration between IH/PM personnel and facility management personnel is vital to correct moldy conditions and prevent future mold growth. Use the following procedures and refer to Appendix A: Mold Investigation Decision Logic, for guidance on mold investigation, evaluation, and remediation for routine assessments.

Air sampling for mold should never be part of a routine assessment. Remediation strategies can generally be made on the basis of a visual inspection or confirmation with a bulk or surface sample. In addition, air sampling methods for some mold are prone to false negative results and therefore cannot be used to definitively rule out contamination².

Safety Tips While Investigating and Evaluating Mold and Moisture Problems³

- Be careful not to touch mold or moldy items with bare hands.
- Do not allow mold or mold spores to get into your eyes.
- Do not breathe in mold or mold spores.
- Consult **Appendices B, C, and D** for Remediation, Personal Protective Equipment (PPE) to be used during remediation and Containment guidance.
- Consider using PPE when disturbing mold during investigation. Depending upon the situation, a half-face NIOSH-approved N-95 respirator, gloves, and goggles are recommended.

Communicate with building occupants at all stages of process, as appropriate¹.

When mold growth requiring Level III or IV (large-scale) remediation is found (See Appendix B), the building owner, management, and/or employer should notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion. Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals seeking medical attention should be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

Routine Investigation and Evaluation of moisture and mold problems³.

- Determine the total surface area of visible mold affected (square feet).
- Consider the possibility of hidden mold.
- Clean up small mold problems and fix moisture problems before they become large problems.
- Select remediation personnel or team based on the assessment.
- Investigate areas associated with occupant complaints.
- Identify source(s) or cause of water or moisture problem(s).
- Note type of water-damaged materials (wallboard, carpet, etc.).
- Check inside air ducts and air handling unit.

Assessments Requiring Sampling

Air sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician/medical practitioner desires to confirm the causative agent.

Pre- and post-remediation air sampling may be necessary if there is evidence from a visual inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination².

When air sampling is deemed necessary and is performed, outdoor air samples should be collected at the same time at the fresh air intake, which serves the suspected area. Values obtained should be compared and the indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air⁴. If they are different, bioamplification is occurring and the problem needs corrected.

Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', "Bioaerosols: Assessment and Control⁴."

Sample analysis should follow analytical methods recommended by the American Industrial Hygiene Association (AIHA) or the American Conference of Governmental Industrial Hygienists (ACGIH). The laboratory conducting the analyses should participate in the AIHA Environmental Microbiology Proficiency Analytical Testing (EMPAT) program. For further mold assistance, contact USACHPPM, Industrial Hygiene Field Services Program, DSN 584-3118 or (410) 436-3118.

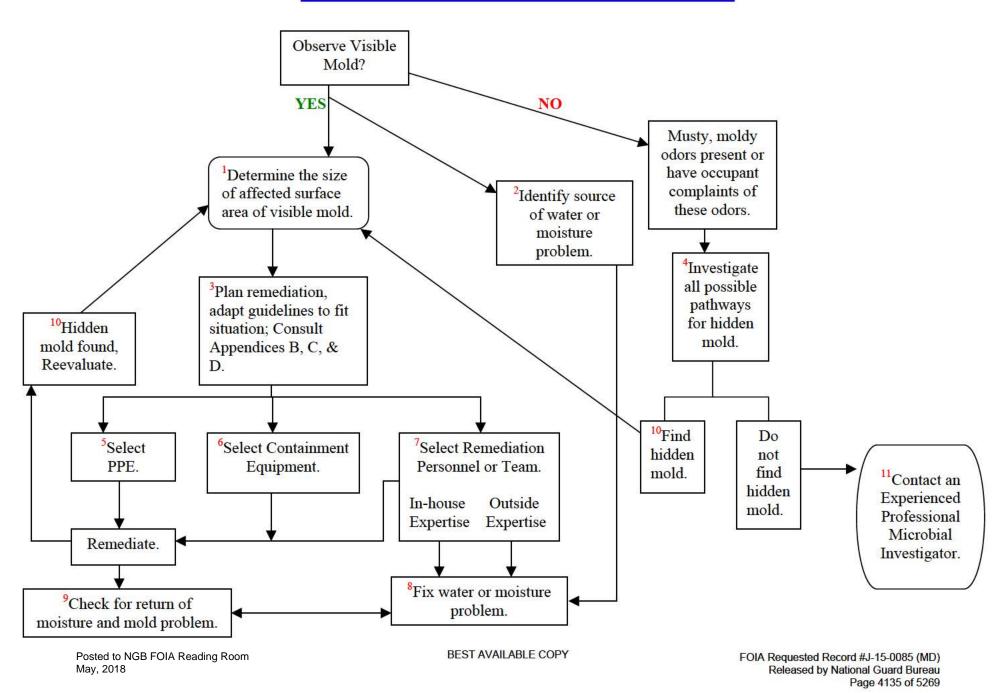
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- 3. U.S. Environmental Protection Agency. *Mold Remediation in Schools and Commercial Buildings*, EPA 402-K-01-001, March 2001.
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- 5. U.S. Environmental Protection Agency. *Should You Have the Air Ducts In Your Home Cleaned?* EPA-402-K-97-002. October 1997.
- 6. Institute of Inspection, Cleaning and Restoration Certification (IICRC). *IICRC S500*, *Standard and Reference Guide for Professional Water Damage Restoration*, 2nd edition. 1999.
- 7. Occupational Safety & Health Administration. *Respiratory Protection Standard*, 29 *Code of Federal Regulations 1910.134*. 63 FR 1152. January 8, 1998.
- 8. American Industrial Hygiene Association, *Report of Microbial Growth Task Force*, AIHA Press, Fairfax, VA, May 2001.

APPENDIX A

MOLD INVESTIGATION DECISION LOGIC

MOLD INVESTIGATION DECISION LOGIC



MOLD INVESTIGATION DECISION LOGIC NOTES:

- 1. Roughly approximate the total surface area of visible mold. Categorization of the remediation levels are sometimes borderline, so when trying to decide the category to apply, consider the extent of visible growth, such as a heavy blanket of growth on the surface, to barely visible. If heavy growth is apparent, consider moving up to the next level of protection.
- 2. Do not skip this step. Address the source of water or moisture problem or the mold will simply reappear.
- 3. Always protect the health and safety of the building occupants and remediators.
- 4. Mold may be hiding on the backside of drywall, vinyl wallpaper, or paneling, the top of ceiling tiles, the underside of carpets and pads. Check walls behind furniture, pipe chases and utility tunnels, porous thermal or acoustic liners inside ductwork, or check the rafters (due to roof leaks or insufficient insulation)³.
- 5. Utilize appendices B and C for remediation guidance. Use your best judgment during investigations, if not disturbing the mold you may need minimal to no PPE. Do not alarm building occupants unnecessarily, but protect yourself as necessary.
- 6. If the containment is working properly, the polyethylene sheeting will billow inwards on all surfaces. If it flutters or billows outward, containment has not been achieved, and you should find and correct the problem before starting your remediation activities³. Confirm negative pressure with smoke tubes.
- 7. Select remediation personnel who have the experience and training needed to implement the remediation plan.
- 8. You must completely fix or eliminate the water or moisture problem to solve the problem.
- 9. You should revisit the site(s) approximately two weeks after remediation, and it should show no signs of water damage or mold growth.
- 10. If you discover hidden mold, revise your plan by reassessing the size of moldy area.
- 11. If you believe that you have a hidden mold problem, you may want to consider hiring an experienced mold investigative professional.

APPENDIX B

[Adapted from EPA 402-K-01-001, March 2001]

Mold Remediation Guidelines

Appendix B presents remediation guidelines for building materials that have or are likely to have mold growth. The guidelines in Appendix B are designed to protect the health of occupants and cleanup personnel during remediation. These guidelines are based on the area and type of material affected by water damage and/or mold growth. Please note that these are guidelines; some professionals may prefer other cleaning methods.

If you are considering cleaning your ducts as part of your remediation plan, you should consult EPA's publication entitled, Should You Have the Air Ducts In Your Home Cleaned? (5) Although this EPA document has a residential focus, the same concept applies to other building types. If possible, remediation activities should be scheduled during off-hours when building occupants are less likely to be affected.

Although the level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator and/or occupant exposure, professional judgment should always play a part in remediation decisions. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of health effects or research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. The remediation manager will then use professional judgment and experience to adapt the guidelines to particular situations. When in doubt, caution is advised. Consult an experienced mold remediator for more information.

Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
	SMALL - Total	Surface Area Affected Less Than 10 squar	re feet (ft²)
Books and papers	3		
Carpet and backing	1, 3		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3	Minimum	
Non-porous, hard surfaces (plastics, metals)	1, 2, 3	N-95 respirator, gloves, and goggles	None required
Upholstered furniture & drapes	1, 3		
Wallboard (drywall and gypsum board)	3		
Wood surfaces	1, 2, 3		
	MEDIUM - T	Total Surface Area Affected Between 10 and	100 ft ²
Books and papers	3		
Carpet and backing	1,3,4	4	
Concrete or cinder block	1,3	Limited or Full	Limited
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3	Use professional judgment, consider	Use professional judgment, consider
Non-porous, hard surfaces (plastics, metals)	1,2,3	potential for remediator exposure and size of contaminated area	potential for remediator/occupant exposure and size of contaminated area
Upholstered furniture & drapes	1,3,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3		
		face Area Affected Greater Than 100 ft ² or ediator Exposure During Remediation Esti	
Books and papers	3		
Carpet and backing	1,3,4	7	
Concrete or cinder block	1,3	Full	Full
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4	Use professional judgment, consider potential for remediator/occupant exposure	Use professional judgment, consider potential for remediator exposure and size
Non-porous, hard surfaces (plastics, metals)	1,2,3	and size of contaminated area	of contaminated area
Upholstered furniture & drapes	1,2,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3,4		

*Use professional judgment to determine prudent levels of Personal Protective Equipment and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased Personal Protective Equipment, if, during the remediation, more extensive contamination is encountered than was expected. These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then the Occupational Safety and Health Administration (OSHA) requires PPE and containment. An experienced professional should be consulted if you and/or your remediators do not have expertise in remediating contaminated water situations.

†Select method most appropriate to situation. Since molds gradually destroy the things they grow on, if mold growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mold growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.

Cleanup Methods

- Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.
- Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.
- Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.
- Method 4: Discard Remove water-damaged materials and seal in plastic bags while inside
 of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Containment

- Limited: Use polyethylene-sheeting ceiling to floor around affected area with a slit entry and covering flap; maintain area under negative pressure with HEPA filtered fan unit. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.

Table developed from literature and remediation documents including Bioaerosols: Assessment and Control (American Conference of Governmental Industrial Hygienists, 1999) (4) and IICRC S500, Standard and Reference Guide for Professional Water Damage Restoration, (Institute of Inspection, Cleaning and Restoration, 1999) (6)

APPENDIX C

[Adapted Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

PERSONAL PROTECTIVE EQUIPMENT

Skin and Eye Protection

Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or polyvinyl chloride (PVC). If you are using a mild detergent or plain water, ordinary household rubber gloves may be used. To protect your eyes, use properly fitted goggles or a full-face respirator with HEPA filter. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not acceptable.

Respiratory Protection

Respirators protect cleanup workers from inhaling airborne mold, mold spores, and dust. Respiratory protection used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended(7). All individuals must be trained, have medical clearance, and must be fit-tested by a trained professional before wearing a respirator.

- Minimum: When cleaning up a small area affected by mold, you should use an N-95 respirator. This device covers the nose and mouth, will filter out 95% of the particulates that pass through the filter. In situations where a full-face respirator is in use, additional eye protection is not required.
- Limited: Limited PPE includes use of a half-face or full-face air-purifying respirator (APR) equipped with a HEPA filter cartridge. These respirators filter mold particles in the air. Note that half-face APRs do not provide eye protection. In addition, the HEPA filters do not remove vapors or gases. You should always use respirators approved by the National Institute for Occupational Safety and Health.
- Full: In situations in which high levels of airborne dust or mold spores are likely or when intense or long-term exposures are expected (e.g., the cleanup of large areas of contamination), a full-face, powered air-purifying respirator (PAPR) is recommended. Full-face PAPRs use a blower to force air through a HEPA filter. The HEPA-filtered air is supplied to a mask that covers the entire face or a hood that covers the entire head. The positive pressure within the mask or hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable Protective Clothing

Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.

- Limited: Disposable paper overalls can be used.
- Full: Mold-impervious disposable head and foot coverings, and a body suit made of a breathable material, such as TYVEK®, should be used. All gaps, such as those around ankles and wrists, should be sealed (many remediators use duct tape to seal clothing).

®TYVEK, DuPont de Nemours, E.I., & Co., Wilmington, DE.

APPENDIX D

[Source: EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings, March 2001]

CONTAINMENT GUIDANCE

Containment

The purpose of containment during remediation activities is to limit release of mold into the air and surroundings, in order to minimize the exposure of remediators and building occupants to mold. Mold and moldy debris should not be allowed to spread to areas in the building beyond the contaminated site.

The two types of containment recommended in Appendix B are limited and full. The larger the area of moldy material, the greater the possibility of human exposure and the greater the need for containment. In general, the size of the area helps determine the level of containment. However, a heavy growth of mold in a relatively small area could release more spores than a lighter growth of mold in a relatively large area. Choice of containment should be based on professional judgment. The primary object of containment should be to prevent occupant and remediator exposure to mold.

Containment Tips

- Always maintain the containment area under negative pressure.
- Exhaust fans to outdoors and ensure that adequate makeup air is provided.
- If the containment is working, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, containment has been lost, and you should find and correct the problem before continuing your remediation activities.

Limited Containment

Limited containment is generally recommended for areas involving between 10 and 100 square feet (ft²) of mold contamination. The enclosure around the moldy area should consist of a single layer of 6-mil, fire-retardant polyethylene sheeting. The containment should have a slit entry and covering flap on the outside of the containment area. For small areas, the polyethylene sheeting can be affixed to floors and ceilings with duct tape. For larger areas, a steel or wooden stud frame can be erected and polyethylene sheeting attached to it. All supply and air vents, doors, chases, and risers within the containment area must be sealed with polyethylene sheeting to

minimize the migration of contaminants to other parts of the building. Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this case, containment should be installed from the floor to the ceiling deck, and the filters in the air-handling units serving the affected area may have to be replaced once remediation is finished.

The containment area must be maintained under negative pressure relative to surrounding areas. This will ensure that contaminated air does not flow into adjacent areas. This can be done with a HEPA-filtered fan unit exhausted outside of the building. For small, easily contained areas, an exhaust fan ducted to the outdoors can also be used. The surfaces of all objects removed from the containment area should be remediated/cleaned prior to removal. The remediation guidelines outlined in Appendix B can be implemented when the containment is completely sealed and is under negative pressure relative to the surrounding area.

Full Containment

Full containment is recommended for the cleanup of mold-contaminated surface areas greater than 100 ft² or in any situation in which it appears likely that the occupant space would be further contaminated without full containment. Double layers of polyethylene should be used to create a barrier between the moldy area and other parts of the building. A decontamination room or airlock should be constructed for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber. Respirators should be worn until remediators are outside the decontamination chamber. PPE must be worn throughout the final stages of HEPA vacuuming and damp-wiping of the contained area. PPE must also be worn during HEPA vacuum filter changes or cleanup of the HEPA vacuum.

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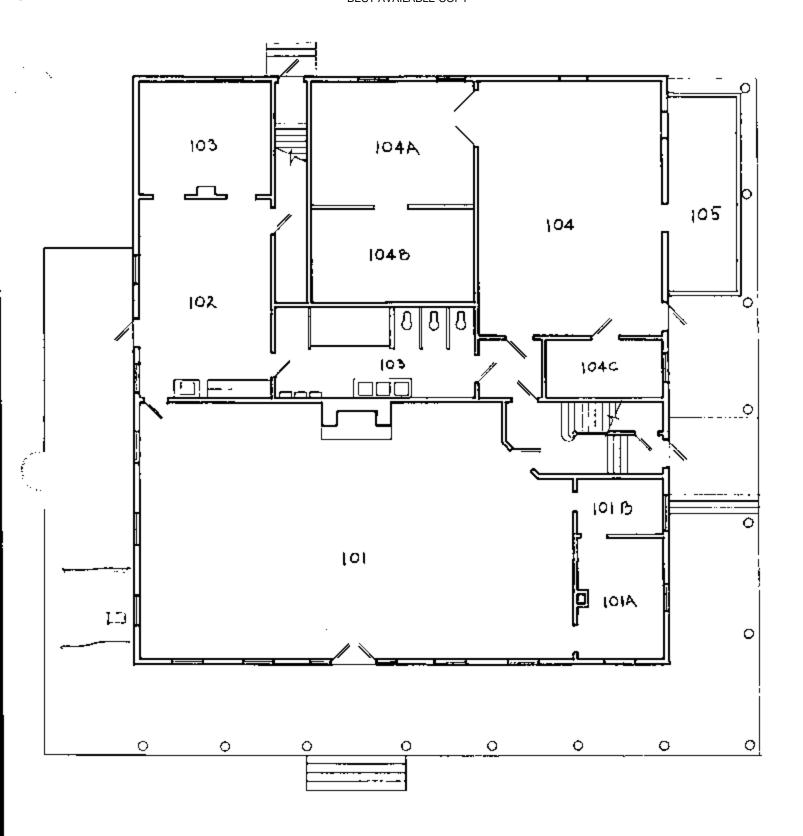


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MDARNG Facilities IH Baseline Surveys, Pikesville Military Reservation, Baltimore MD, Project No. 55-ML-01ED-03/05

APPENDIX G

SITE MAPS

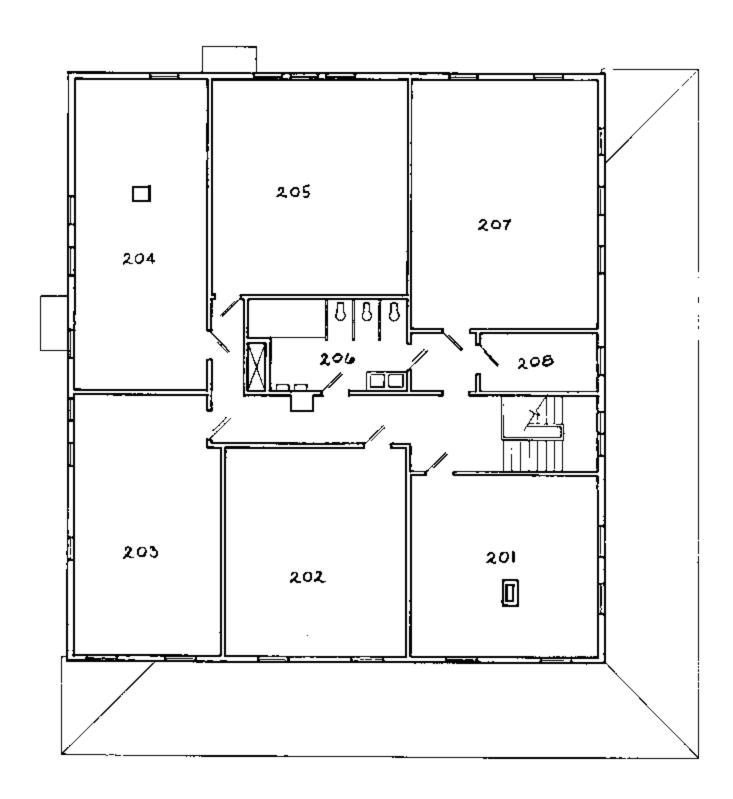


PIKESVILLE - N.C.O. CLUB

FIRST FLOOR PLAN
NO SCALE

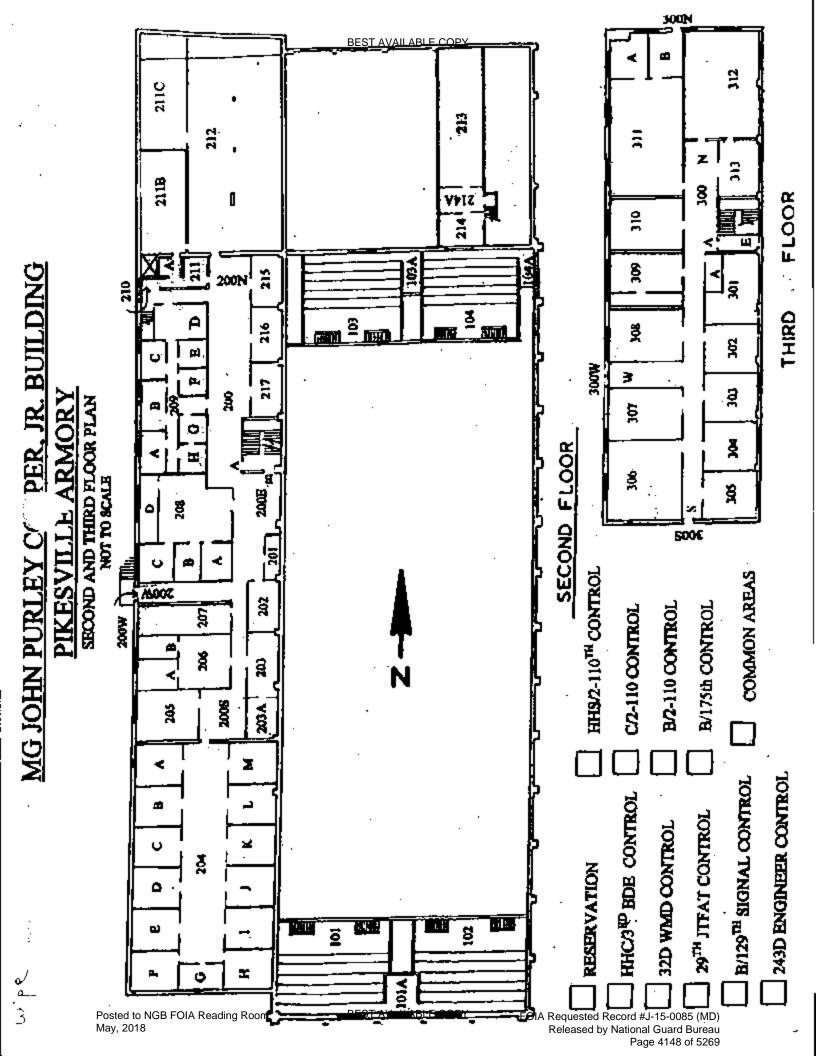
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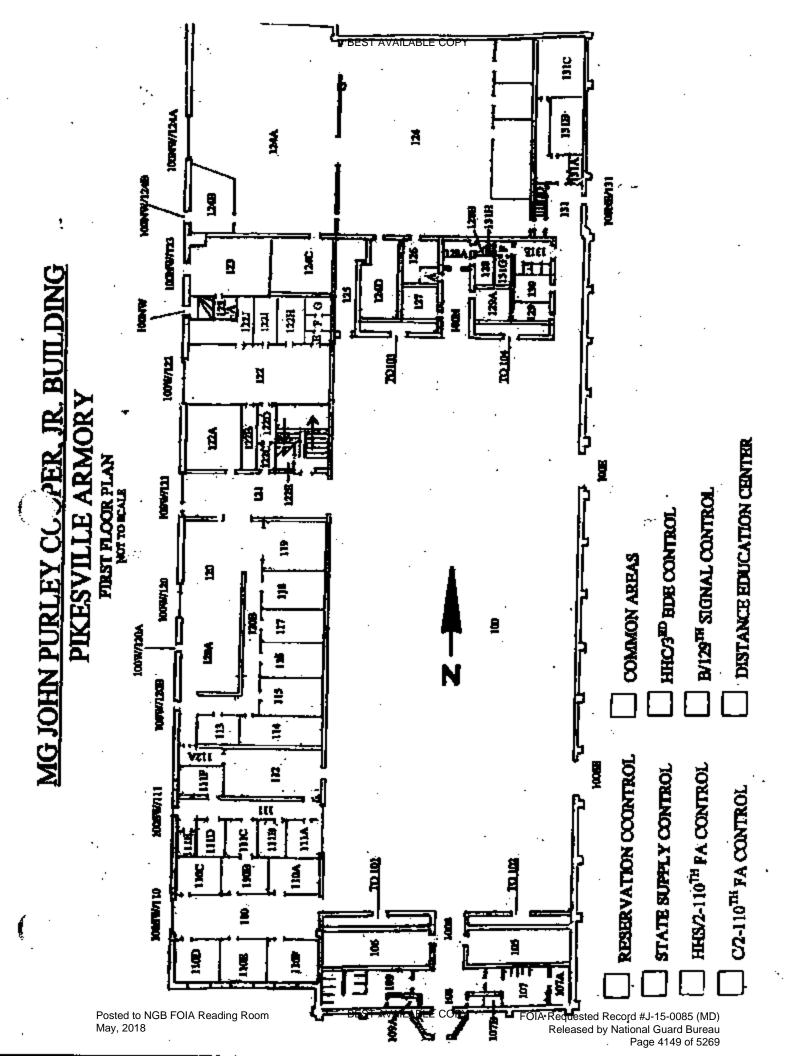
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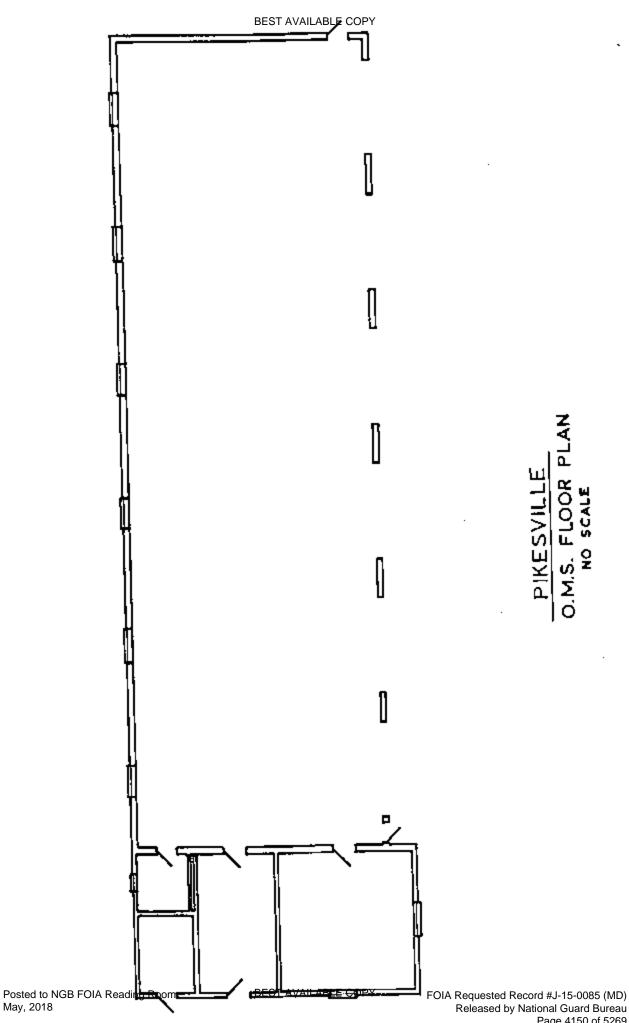


PIKESVILLE - N.C.O. CLUB SECOND FLOOR PLAN NO SCALE

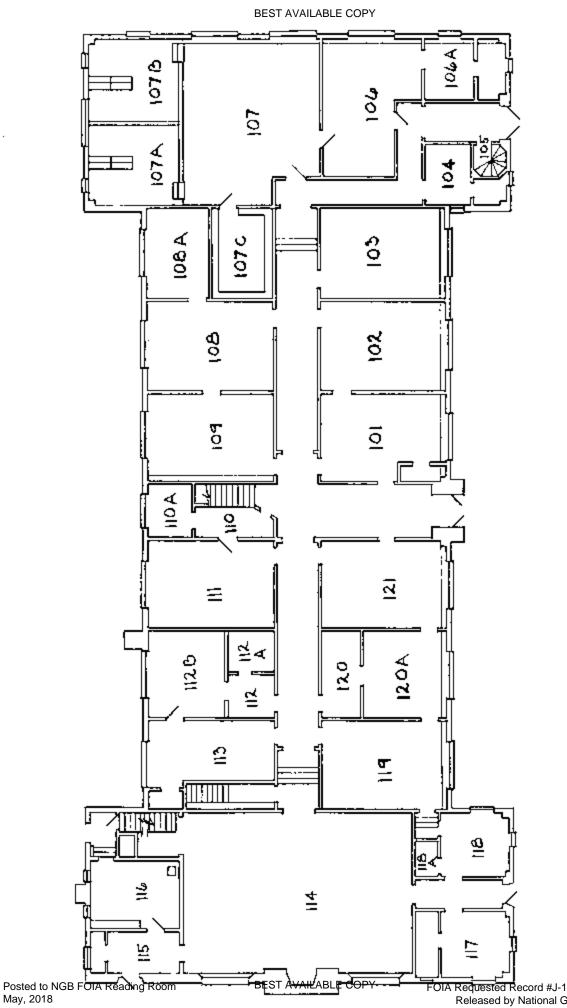
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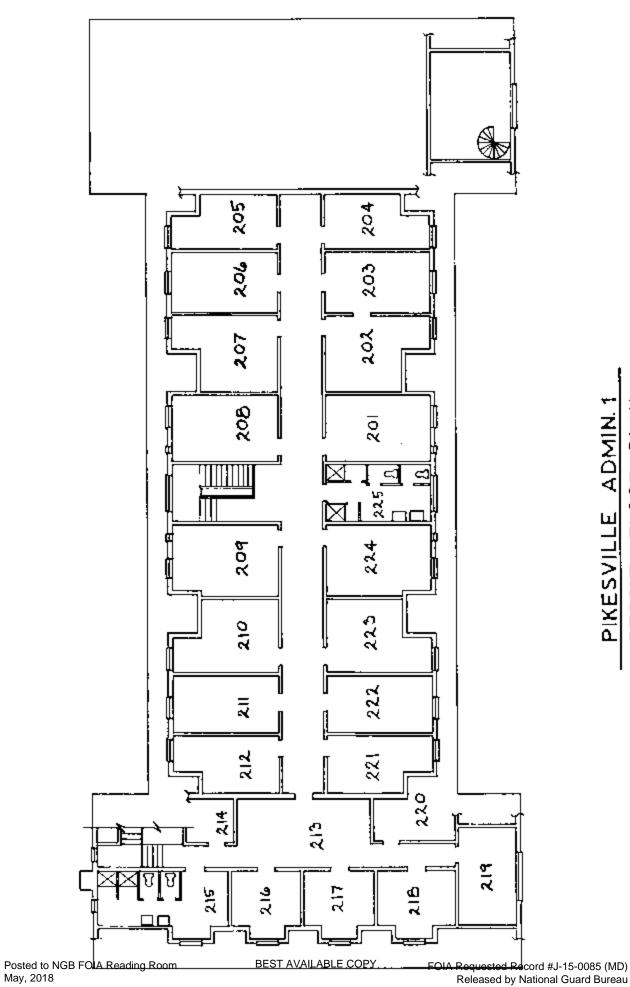
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ADMIN. FLOOR NO SCALE FIRST

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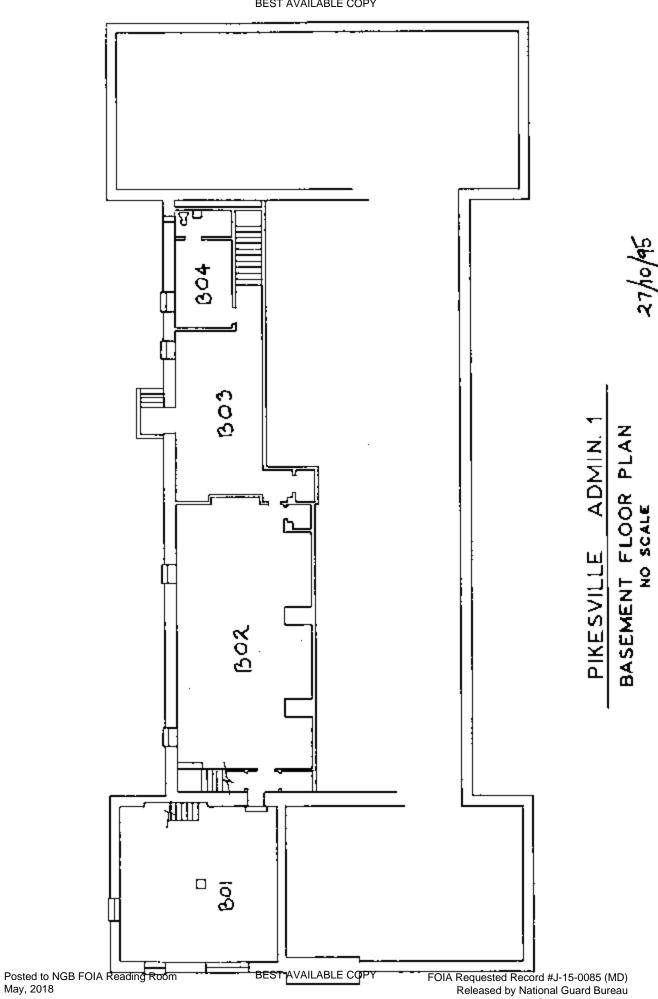


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SECOND FLOOR PLAN

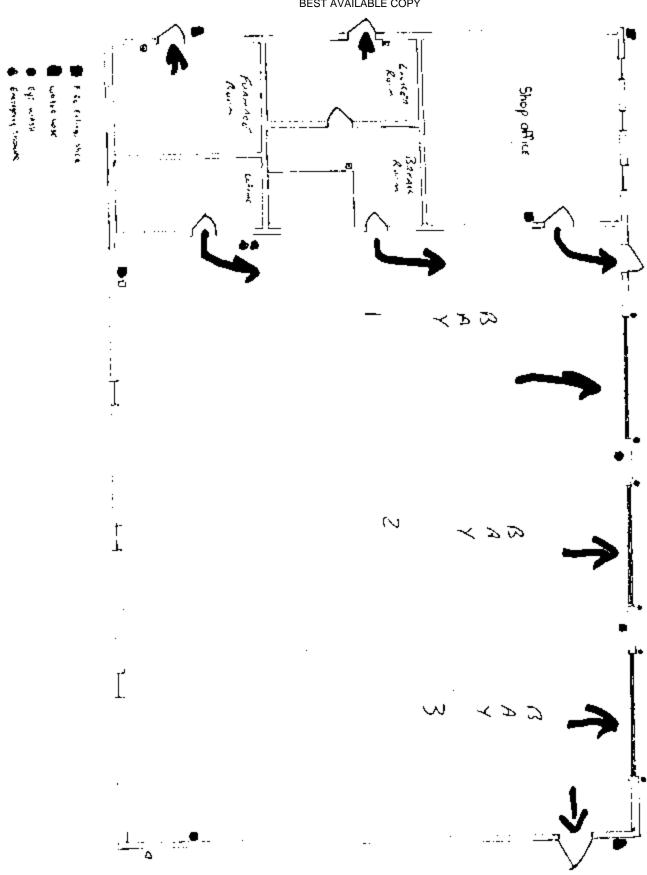
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Industrial Hygiene Study

National Guard Facility Pikesville Readiness Center 610 Reistertown Road Pikesville, Maryland 21208-5197

Prepared for:

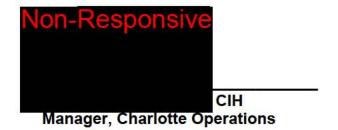
National Guard Bureau Region North IH Office 301-IH Old Bay Lane Havre de Grace, Maryland 21078

Prepared by:

The El Group, Inc. 2101 Gateway Centre Blvd. Morrisville, North Carolina 27560

Report Date: December 30, 2008

Project ID: IHMO080101.03





Senior Industrial Hygienist

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Appendix A: Photographs

Appendix B: Laboratory Analysis Report

EXECUTIVE SUMMARY

An industrial hygiene survey was conducted July 30, 2008 at the Readiness Center Facility located in Pikesville, Maryland. The study was performed by Mr. Non-Responsive CIH.

Employees were not performing tasks that provided excessive noise levels, as such; noise exposure monitoring was not conducted.

Lighting within the facility was also evaluated. Lighting was found to be within applicable recommended levels.

Various surfaces within the HVAC system and throughout the facility were screened for lead. The screening was completed using surface/wipe and air samples. None of the air samples collected were found to have detectable levels of the respective lead contaminant. Lead contamination was identified in the old indoor firing range and 3rd floor locker room.

Indoor air quality parameters were also evaluated during the assessment. Indoor air quality was found to be within those parameters established by the Environmental Protection Agency (EPA) and American Society of Heating, Refrigerating, and Airconditioning Engineers, Inc. (ASHRAE). The firing range is inactive but could have contributed to lead exposure to building occupants. If not addressed, these may provide sources of poor indoor air quality.

During the assessment, written programs for Health and Safety, NESHAP Operations and Maintenance Asbestos Survey, and the Hazard Communication Program were requested for review, however, the onsite personnel was not able to locate the documents.

Operation Description

The Pikesville Readiness Center primarily serves as an office setting and equipment storage facility. The facility consists of a three story response center that contains a converted maintenance bay, office spaces, decommissioned gun range, and unit storage areas. Additionally, the site also contains several exterior storage and administrative buildings.

The exterior walls of the building were constructed of an EIFS/Stucco or stone. The interior walls were composed of a combination of concrete block, stone and plaster. The roof of the facility consisted of a pitched shingle roof system. The heating, ventilating, and air conditioning system (HVAC) consisted of window unit air conditioning and gasfired boiler with unit radiators. The floors were composed of a poured concrete slab and in some areas were finished with vinyl floor tiles or hard wood flooring. The ceilings were generally composed of wooden roof deck and in some areas were finished with a suspended drop ceiling system.

Site personnel at the time of the site assessment consisted of four administrative personnel. The employees on site were conducting general administrative work.

Noise Survey

Employees were not performing tasks that provided excessive noise levels, as such; noise exposure monitoring was not conducted.

Lead Testing

At the time of the assessment, no activities were observed which may lead to lead exposure other than ammunition handling. The facility contains an unoccupied room which was once an indoor firing range

Various surfaces within the facility were screened for lead using surface/wipe samples and the collection of air samples. Surface/wipe samples were collected using Ghost WipeTM samples and were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 µm MCE cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, MD for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix B.

Lead Testing Results Summary

Location	Air ug/m³	Surface ug/ft²	Bulk	Chip %Pb
L1: Kitchen Cooler Top		200		
L1A: Kitchen Food Prep Table		15		
L2: 104 Window Sill		53		
L3: 101 Floor		15		
L4: 124 Bench		1500		
L5: 206B Desk		8.8		
L6: 208 Locker Top		28		
L7: Hall at 212		190		
L8: Range Heater		3,300		
L9: 300 @ 309 Floor		46		
L10 Blank		<12		
P1: Stairwell @ 100				0.63
P2: Room 101				0.28
P3: Room 209 Window				0.059
P4: Stairwell				0.09
P5: 208 Window				0.024
P7: Boiler Room				0.4
P8: 3 rd Floor Latrine				0.01
P9: Room 124				0.19
1: Old Range	<2.5			
2: 2 nd Hall/209	<2.9			
3: Blank	<3			
Criteria	50	200	5,000	0.5

Key: ND - None Detected

PB - Lead

Detectable levels of lead were identified throughout the facility, specifically in the former indoor firing range heater, classrooms and locker room. The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying contaminated surfaces. In

the" Derivation of Wipe Surface Screening Levels for Environmental Chemicals", the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, HUD levels of 40 µg/ft² on floors and 250 µg/ft² on windowsills should be observed. No detectable levels of lead were identified in those air samples collected. Currently, OSHA observed an 8-hour time weighted average of 50 ug/m³. Deteriorated paint was observed throughout the facility. Delaminated paint was mostly due to age along with prolonged exposure to elevated humidity levels. Lead-based paint chips were identified in stairwell adjacent to Room 105.

<u>Lighting</u>

A lighting assessment was conducted throughout the facility. The survey was conducted with large bay doors closed. Measurements were collected using a Cooke Cal-Light 400L Precision Light Meter (Serial No. 98047EL). The light meter was last calibrated on February 22, 2008. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Light Survey Assessment Summary				
Foot Candles	Recommended Lighting	Sufficient Lighting		
7-51	30-50	Yes		
12-53	30-50	Yes		
83-97	30-50	Yes		
64-92	30-50	Yes		
73-109	50	Yes		
37-41	5	Yes		
38-46	10	Yes		
21-63	30	Yes		
18-27	5	Yes		
15-31	5	Yes		
48-63	30-50	Yes		
78-90	30-50	Yes		
83-118	30-50	Yes		
38-46	30-50	Yes		
3-31	5	Yes		
52-71	30-50	Yes		
67-73	30-50	Yes		
2-13	30-50	Yes		
25-62	7	Yes		
18-37	5	Yes		
16-42	30	Yes		
62-87	30-50	Yes		
55-73	30-50	Yes		
	7-51 12-53 83-97 64-92 73-109 37-41 38-46 21-63 18-27 15-31 48-63 78-90 83-118 38-46 3-31 52-71 67-73 2-13 25-62 18-37 16-42 62-87	Foot Candles Recommended Lighting 7-51 30-50 12-53 30-50 83-97 30-50 64-92 30-50 73-109 50 37-41 5 38-46 10 21-63 30 18-27 5 15-31 5 48-63 30-50 78-90 30-50 83-118 30-50 38-46 30-50 3-31 5 52-71 30-50 67-73 30-50 25-62 7 18-37 5 16-42 30 62-87 30-50		

Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a Fluke IAQ Meter, Model 975. The IAQ Meter was last calibrated in April 2008.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior of the structure ranged from 70.7 to $87.4^{\circ}F$ with relative humidity readings ranging from 36.6% to 67.9%. During the survey, CO_2 levels ranged from 427 ppm to 678 ppm within the facility compared to an outdoor CO_2 level of 397 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO_2 recommended is 1,097 ppm (397 ppm + 700 ppm). The results of the testing met the ASHRAE guidelines.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
104	81.5	63.9	678	0
103	81.5	64.1	741	0
211/212	87.4	58.7	550	0
2 nd floor hall	83.3	67.3	576	0
208	78.8	36.6	592	0
206	81.5	45.8	628	0
205	83.3	58.7	618	0
309 Latrine	82.9	61.3	468	0
124	81.5	58.4	506	0
131B	73.4	63.2	533	0
131C	70.7	61.6	510	0
120 Kitchen	80.6	66.3	460	0
120B	80.9	66.3	458	0
112	80.6	67.9	427	0
110	81.5	63.7	496	0
Outdoors	84.3	75,2	397	0
Criteria	73.0-79.0	30-50	<1,097	<9.0

Humidity was found to exceed guidelines in a majority of the facility. Humidity levels should be maintained below 60%.

Additionally, temperature ranges were found to be within recommended ranges with the exception of Room 205, 2nd floor hallway and Room 211. These areas were found to exceed 83 °F.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspected was conducted to assess sources or pathways of IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- Significant damage to plaster adjacent to windows throughout the facility. Many windows were found to contain broken or cracked panes of glass or damaged window glazing leading to water intrusion.
- Water damaged plaster was identified in the lower level restrooms (107 and 109) which appeared to have been caused by previous water loss/flooding within the restrooms.
- Roof leaks were identified in Rooms 101, 208D, 110C and 131. At the time of the assessment, building finish materials were dry.
- Fungal growth was identified in Room 201 (Telephone closet). Fungal growth appears to be due to prolonged periods of elevated humidity.
- Room 102 was found to have a significant infestation of bees.
- Room 206 showed evidence of a rodent infestation.

Air quality samples were collected from Rooms 101, 201, 208 as well as outdoors (as control). Indoor fungal spore levels ranged from 468 to 3,060 spores/m³. The concentration observed outdoors was found to be 4,570 spores/m³. The highest indoor concentration was identified in room 201. Room 201 contains visible fungal growth. Based on a review of the analytical data, no airborne amplification of fungal spores was present despite the presence of visible fungal growth located in Room 201.

Location	Concentration	Predominant Genera
101	1,870 sp/m ³	Basidiospores
201	3,060 sp/m ³	Cladosporium
208	468 sp/m ³	Basidiospores
Outdoors	4,570 sp/m ³	Basidiospores

Suspect Asbestos Containing Building Materials

Suspect asbestos containing materials include sheetrock/joint compound, plaster wall and ceiling systems, floor tiles and associated mastic, and vinyl covebase. Thermal system insulation was found to be a combination of paper wrapped fiberglass with PVC elbows and well as pre-formed TSI with mudded elbows.

Maintenance Bay

The area formerly utilized as a maintenance bay is currently used for storage. Maintenance activities are no longer performed.

Ventilation System Assessment

The facility was found to boiler operated radiant heating and window unit air conditioners. A closed system boiler is located in the boiler room. No issues were identified with the mechanical system components.

A local exhaust ventilation system was identified in Room 124A. The system is no longer in use as the space is no longer utilized as a maintenance garage. The LEV system was found to contain two flex duct attachments with 6" duct. Flow rate measurements ranged from 200 cfm to 209 cfm for branch A and 374 cfm to 380 cfm for branch B. Branch A was found to have a crimped section where the flex line joins the main trunk line. The LEV system was not found to operate within the recommended parameters of the American Conference of Governmental Industrial Hygienist (ACGIH) Industrial Ventilation Manual: A Manual of Recommended Practice. The ACGIH recommends a total flow rate of 1,480 to 2,200 cubic feet per minute (CFM).

Limitations

May, 2018

This report summarizes our evaluation of the conditions observed at the above referenced location. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicated within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and The El Group, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

References

Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Administration.

Lead - (29 CFR 1910.1025(h))

American Conference of Governmental Industrial Hygienists (ACGIH) – Threshold Limit Values and Biological Exposure Indices, 2008 Edition

Industrial Ventilation: A Manual of Recommended Practice for Design, 25th Edition

Georgia Army National Guard: Standard Army Safety and Occupational Health Inspection Checklist; 1 October 1999 Edition

ANSI Z358.1 – 2004, Emergency Eye Wash and Shower Equipment

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Ventilation for Acceptable Indoor Air Quality, 62.1-2007.

RP-1-2004, Industrial Lighting, Illuminating Engineering Society of North America/ANSI

RP-7-2001, Industrial Lighting, Illuminating Engineering Society of North America/ANSI

National Emission Standard Hazardous Air Pollutants (NESHAP) - The standards for asbestos are contained in 40 CFR 61.140 through 61.157.

Environmental Protection Agency (EPA) standards (40 Code of Federal Regulations (CFR) 745.227(h)(3))

Derivation of Wipe Surface Screening Levels for Environmental Chemicals, the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)

The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation

Appendix A

Photographs



Thermal system insulation located adjacent to Room 103



Room 212: Old Firing Range



Wall mounted heater located in 212. Elevated levels of surface lead on heater blades.



Plaster damage to ceiling. Room 208D



Evidence of rodent infestation: Room 206



View of 3rd floor locker room



Air conditioning condensate draining into garbage can: Room 124



Possible PCB-containing ballasts maintained in Room 124





View of bees located in Room 102. Active hive present.



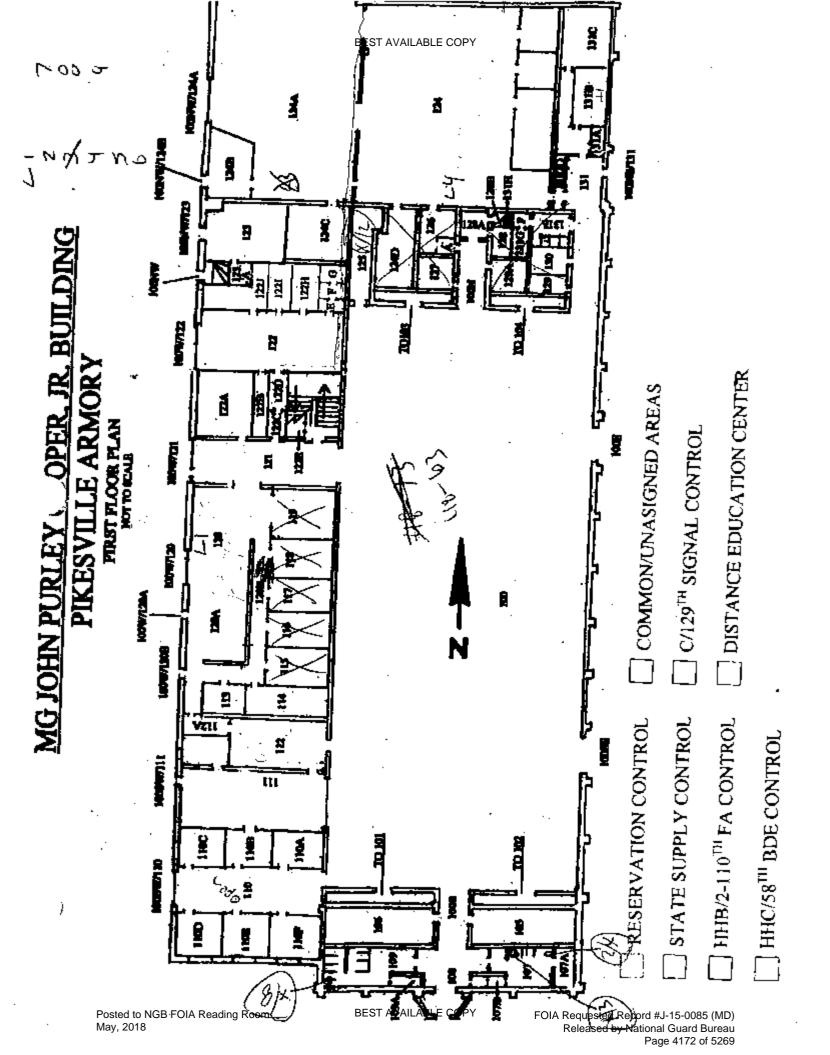
Water damaged plaster in Room 107

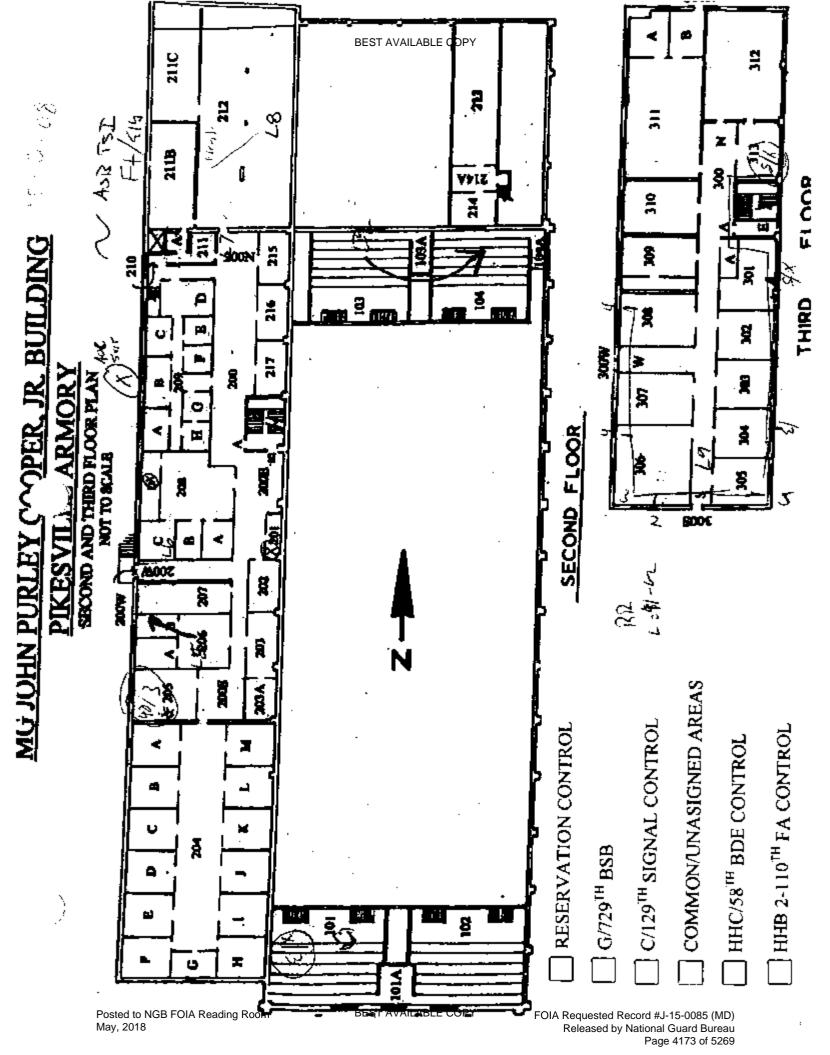


Microbial growth located in Room 201



Building exterior





Appendix B

Laboratory Analysis Report



AMA Analytical Services, Inc. BEST AVAILABLE COPY



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

Job Name: National Guard Bureau

RC 509 Pikesville, MD

Chain Of Custody:

Address:

Client:

301-IH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation

Job Location:

Not Provided

Date Submitted:

9/4/2008

Comments

No location given.

Havre de Grace, Maryland 21078

Job Number:

Not Provided

Person Submitting:

Attention:

P.O. Number:

Not Provided

Sample Condition

Date Analyzed:

Acceptable

9/8/2008 9/10/2008

AMA Sample #	0881875
Client ID	208
Analyst ID	TLW
Collection Apparatus	Allergenco
Sample Volume (L)	150
Analytical Sensitivity (sp/m³)	28
Sample Condition	Acceptable

Report Date: 0881876 AMA Sample # 201 Client ID TLW Analyst ID Allergenco Collection Apparatus 150 Sample Volume (L) Analytical Sensitivity (sp/m3) 28

	Raw CT.	%	sp/m³		Raw CT.	%	sp	/m³
Alternaria	1	5.9%	28	Alternaria				
Ascospores	3	17.6%	83	Ascospores	6	5.4%		165
Aureobasidium	:			Aureobasidium				
Basidiospores	4	23.5%	110	Basidiospores	42	37.8%		1,160
Bipolaris/Drechslera/Helm.				Bipolaris/Drechslera/Helm.	Present		<	28
Boletus			1	Boletus				
Botrytis			:	Botrytis		ļ		
Cercospora				Cercospora				
Chaetomium				Chaetomium	Present		<	28
Cładosporium				Cladosporium	44	39.6%		1,210
Coprinus				Coprinus				
Curvularia				Curvularia				
Epicoccum			i	Epicoccum		:		
Fusarium				Fusarium	1	0.9%		28
Ganoderma		i	: 	Ganoderma				
Nigrospora				Nigrospora	Present		<	28
Penicillium / Aspergillus	3	17.6%	83	Penicillium / Aspergillus	13	11.7%		358
Pithomyces				Pithomyces				
Rusts				Rusts				
Smuts/Periconia/Myxomycete	s 1	5.9%	28	Smuts/Periconia/Myxomycetes	1	0.9%		28
Stachybotrys	: :			Stachybotrys	. :			
Stemphylium	i I	i i	l i	Stemphylium	!			
Trichoderma		'		Trichoderma	. :			
Torula	!	!	!	Torula	:	!		
Ulocladium				Clockadium				
Zygomycetes		,	į	Zygomycetes	. !			
Other Colorless	4	23.5%	110	Other Colorless	: 1	0.9%		28
Unknown	1	5.9%	28	Unknown	2	1.8%		55
Hyphal Fragments*				Hyphal Fragments*	1			28
V	İ	:	İ	Arthrinium	Present		<	28
	. :	·		Memnoniella	1	0.9%		28
Totals Spore Concentration			468	Totals Spore Concentration	:	!		3,060
Location	I			Location		'		

An AIHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

Comments

No location given.

AMA Analytical Services, Increst available COPY



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Havre de Grace, Maryland 21078

Job Location: Not Provided Date Submitted:

9/4/2008

State Military Reservation

Job Number:

Not Provided

Person Submitting:

Attention:

Sample Condition

P.O. Number:

Not Provided

Date Analyzed:

9/8/2008 9/10/2008

0881877 AMA Sample # Client ID Analyst ID Collection Apparatus Allergenco Sample Volume (L) Analytical Sensitivity (sp/m³)

OT TLW 150 28 Acceptable

Report Date: 0881878 AMA Sample # Client ID 101 TLW Analyst ID Collection Apparatus Allergenco Sample Volume (L) 150 Analytical Sensitivity (sp/m3) 28 Sample Condition Acceptable

	Raw CT.	%	sp/m³		Raw CT.	%	sp/m³
Alternaria	3	1.8%	83	Alternaria			
Ascospores	24	14.5%	661	Ascospores	6	8.8%	165
Aureobasidium	:			Aureobasidium			
Basidiospores	64	38.6%	1,760	Basidiospores	48	70.6%	1,320
Bipolaris/Drechslera/Helm.			:	Bipolaris/Drechslera/Helm.	' ;		
Boletus				Boletus			
Botrytis				Botrytis	: :		
Cercospora	1	0.6%	28	Cercospora			
Chactomium		:		Chaetomium			
Cladosporium	53	31.9%	1,460	Cladosporium	6	8.8%	165
Coprinus				Coprinus			
Curvularia	Į			Curvularia			
Epicoccum				Epicoccum			
Fusarium			1	Fusarium	Present		< 28
Ganoderma		i		Ganoderma			
Nigrospora				Nigrospora	1 1	1.5%	28
Penicillium / Aspergillus	: 14	8.4%	386	Penicillium / Aspergillus	4	5.9%	110
Pithomyces	Present		< 28	Pithomyces			
Rusts				Rusts			
Smuts/Periconia/Myxomycetes	4	2.4%	110	Smuts/Periconia/Myxomycetes	2	2.9%	55
Stachybotrys				Stachybotrys			
Stemphylium	! ! ! i	!		Stemphylium			
Trichoderma	! .	,		Trichoderma	. !	'	
Torula	! '	:	:	Torula	!!	1	
Clocladium				Clockadium			
Zygomycetes	:	:		Zygomycetes		!	
Other Coloriess	2	1.2%	55	Other Coloriess			
Unknown	1 :	0.6%	28	Unknown	1	1.5%	28
Hyphal Fragments*	1	•	28	Hyphal Fragments*	:		
	:		;				
		:					

No location given.

Location

Comments

An AlHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

Location

Comments

No location given.

AMA Analytical Services, Inc. BEST AVAILABLE COPY



A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SL

Not Provided Job Location:

Date Submitted:

9/4/2008

State Military Reservation Havre de Grace, Maryland 21078

Person Submitting:

Attention:

Job Number: P.O. Number: Not Provided Not Provided

Date Analyzed:

9/8/2008

Report Date:

9/10/2008

General Comments, Disclaimers, and Footnotes

Analytical Method:

Sample are analyzed following the instructions and guidelines outlined in AMA Analytical Services, Inc. SOP 901.

Sample Condition:

Acceptable: The sample was collected and delivered to the our location without disturbing the material on the sampling

Unacceptable: 1. The sample is overloaded with material. 2. The sample trace has been disturbed. 3. The sample was

not collected properly.

Obscured: The loading on the sample is high, possibly obscuring spores present. The quantity reported should be considered the minimum concentration present. The actual concentration may be higher than the

reported concentration.

Spore Notes:

Based on their small size and very few distinguishing characteristics, Aspergillus and Penicillium cannot be differentiated by non-viable sampling methods. There are other types of spores whose morphology is similar to Aspergillus and Penicillium and cannot be differentiated by non-viable sampling methods. Examples of these similar spores are Acremonium, Paecilomyces, Wallemia, and Trichoderma.

Smut, Periconia and Myxomycetes are three different types of organisms that have similar morphological characteristics.

Bipolaris/Dreschlera/Helm: Bipolaris / Dreschlera / Helminthosporium group.

Other Colorless represents all colorless spores that are non-distinctive and unidentifiable.

Hyphal Fragments: A portion of the mycelium that becomes separated from the remainder of the thallus (vegetative body), each of which has the capacity to grow and form new individuals. Results for hyphal fragments are in fragments/m3 and are not incorporated in the total spore concentration.

Quantification:

Analytical Sensitivity (A.S.): This is dependent on the volume of air collected and the amount of the trace that was analyzed.

The value of "Present" indicated in the Raw Count column represents the presence of this spore type during the preliminary exam at 400x. The Raw Count converts to a whole number if the spore type is encountered again during the 1,000x enumeration. The sp/m³concentration will be reported as less than the analytical sensitivity if "Present" is reported in the Raw Count.

Due to rounding, totals may not equal 100%

sp/m3; Spores per cubic meter.

Results are reported to 3 significant figures.

Irus L. Mar. O

Analyst

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client.





Invoice:

95229

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn:

Job Location:

Not Provided

Date Submitted:

10/1/2008

NGB-AVN-SI

Job Number:

Not Provided

Date Analyzed:

10/8/2008

State Military Reservation

Havre de Grace, Maryland

P.O. Number:

Not Provided

Date Invoiced:

10/8/2008

21078

Person Submitting:

Non-Responsive

Attention:

Non-Responsive

Page 1 of 2

AMA Sample #	Client Sample #	Analysis and Sample Type	Turn Around	Cost	Additional Analysis and Sample Type *	Turn Around *	Additional Cost *	Total Cost
0881872	1	AA Lead Air	5 Day +	\$8.00				\$8.00
0881873	2	AA Lead Air	5 Day +	\$8.00				\$8.00
0881874	3	AA Lead Air	5 Day +	\$8.00				\$8.00
0881879	P1	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881880	P2	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881881	P3	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881882	P4	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881883	P5	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881885	₽7	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881886	₽8	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881887	P9	AA Lead Paint	5 Day +	\$9.00				\$9.00
0881888	L1	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881889	L1A	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881890	L2	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881891	L3	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881892	L4	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881893	L5	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881894	L6	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881895	L7	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881896	L8	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881897	L9	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881898	L10	AA Lead Wipe	5 Day +	\$8.00				\$8.00
0881875	208	MLD Spore Trap	5 Day +	\$40.00				\$40.00
0881876	201	MLD Spore Trap	5 Day +	\$40.00				\$40.00
0881877	ОТ	MLD Spore Trap	5 Day +	\$40.00				\$40.00
0881878	101	MLD Spore Trap	5 Day +	\$40.00				\$40.00

Note: Payment Due Upon Receipt.

Note: All Accounts over 30 days are subject to a 1½% per month service charge.

* Only apply if additional analysis was performed on the sample(s)

Account Code:

NATLG





Invoice:

95229

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn:

Job Location:

Not Provided

Date Submitted:

10/1/2008

NGB-AVN-S

State Military Reservation Job Number:

Not Provided

Date Analyzed:

10/8/2008

Havre de Grace, Maryland

P.O. Number:

Not Provided

Date Invoiced:

10/8/2008

21078

Person Submitting:

Non-Res

Attention:

Non-Responsive

Page 2 of 2

AMA Sample # Client Sample #

Analysis and Sample Type Turn Around Cost Additional Analysis and Sample Type * Turn Around * Additional Cost * Total Cost

Sub-Total:

\$344.00

Additional Charge:

\$0.00

Total:

\$344.00

Note: Payment Due Upon Receipt.

Note: All Accounts over 30 days are subject to a 11/2% per month service charge.

Only apply if additional analysis was performed on the sample(s)

Account Code:

NATLG

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

ACCAROLISO TA

Environmental Lead



Address: Client: 301-IH Old Bay Lane, Attn: NGB-AVN-SL National Guard Bureau

Attention:

Havre de Grace, Maryland 21078

State Military Reservation

Job Location:

Not Provided

RC 509 Pikesville, MD

Job Name:

AMA Sample

Client Sample

Analysis Type

Sample Type

Air Volume

Area Wiped

Reporting

Final Result

0881882

0881887 0881886 0881885 0881883

3 쭚 3 2 2

Flame

Flame Flame Flame

Flame

Paint Chip Paint Chip Paint Chip

Paint Chip

*** *** *** ***

*

1.563

7.68

ug/ft^a

N/X N/A NA

0.01 0.01 0.01

%I36 %Ръ

%P5 %Pb

0.024

%Pb

N/A

0.01

0.19 10.0 0.4

%P5

%Ph વત્%

200

ug/ft²

Job Number: P.O. Number: Not Provided Not Provided Date Analyzed:

Date Submitted: Chain Of Custody: Person Submitting 181396 9/8/2008 9/4/2008

Z

Report Date:

9/8/2008

Comments FOIA Requested Record #J-10085 (MD)
Released by National Guard Bureau
Page 4180 of 5269

Summary of Atomic Absorption Analysis for Lead

Number	Number			Œ	(IT)	-				
							. !	i		
		Flame	Air	1210	N/A	2.48	ug/m²		٨	< 2.5
0881873	2	Flame	Air	1026	N/A	2.92	ug/m³		۸	< 2.9 ug/m
0881874	د ى	Flame	Air Blank	0	N/A	3,00	ug/m³		٨	۸
0881879	PI	Flame	Paint Chip	* * *	N/A	0,01	%Pb		_	
0001000	P3 :	Flame	Paint Chin	**	N/A	0.01	%Pb		_	
0001001	p. ;	Flame	Paint Chin	***	N/A	0.01	ન વ‰		•	
0001000	P.4	Flame	Paint Chin	***	N/A	0.01	%РЬ			
2001007	J-4	Talle	district states a							

| No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report applies only to the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types of locations, and collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of the completing of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of the completing of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of the completing of the completing of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of the completing of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completing of the completin transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved

An A1HA (#100470), NVLAP (101143-0), and NY FLAP (#10920) Accredited Laboratory

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



Address: Client 301-IH Old Bay La National Guard Bu

See sihakqap.org for details 100470 四

Page 4181 of 5269

Attention: State Military Reser Havre de Grace, Maryland 21078

> P.O. Number: Job Number:

Not Provided Not Provided

Date Analyzed: Person Submitting:

9/8/2008

Report Date:

9/8/2008 Page 2 of 2 Requested Record #J

Requested Record #J 45 0085 (MQ)*
Released by National Guard Bureau

ureau Joh	Job Name:	RC 509 Pikesville, MD	Chain Of Custody: 181396	181396
ane, Attn: NGB-AVN-SI, Joh	Job Location:	Not Provided	Date Submitted:	9/4/2008

Summary of Atomic Absorption Analysis for Lead

								:		
AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Rej L	Reporting Limit	Final Result	Comments	
:										:
0881896	L8	Flame	Wipe	* * *	1.333	9.00	ug/fr²	3300 ug/ft²	/ 1₹²	
0881807	-0	Flame	Wipe	* * *	1.287	9.33	ug/ft²	46 ug	սաշ/Ո²	
0881898	L10	Flame	Wipe Blank	* * * *	N/A	12.00	В'n	< 12 ug		
Analysis Method for	r Flame: Air, Wip	Analysis Method for Flame: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B	olids: EPA 600/R-93/2	:00(M)-7420; Wate	er: SM-3111B	See QC	Summary to	r analytical results of	See QC Summary for analytical results of quality control samples	
Analysis Method Fo	or Furnace: Air, V	Analysis Method For Furnace: Air, Wipes, Paints, and Sol//Solids: EPA 600/R-93/200(M)-7421; Water: SM-3113B	I/Solids: EPA 600/R-	93/200(M)-7421;	Water: SM-3113B	associa	associated with these sampes NY FI AP accrediation applies	n anolies only to pain	associated with these sampes NY FLAP accrediation applies only to paint chip, wipe, and water	
N/A = Not Applicable	le mg/Kg=	mg/Kg = parts per million (ppm) by weight mg/L = parts per million (ppm)) by weight mg/L =	parts per million (p	ppm)	samples	5.			
%Pb = percent lead by weight ug = micrograms	by weight u	ıg = micrograms	ug/L = parts per billion (ppb)	ו (ppb)						

BEST AVAILABLE COPY

Analyst: Melissa Samp

Note: All results have two significant digits. Any additional digits shown should not be considered when interpreting the result.

Note: All samples were received in good condition unless otherwise noted

Air and Wipe results are not corrected for any blank results

Technical Manager:

G Edward Carney

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report applies and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types of the client to whom it is addressed as a condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types of the client to whom it is addressed as a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types of the client to whom it is addressed as a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of apparently identical to a condition of a condition o locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completed this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. All rights reserved May, 2018

4475 Forbes Blvd. · Lanham, MD, 20706 · (301) 459-2640 · Toll Free (800) 346-0961 · Fax (301) 459-2643





QC Summary

Sample Delivery Group: 16543

Flame

102.38%

100.89%

1,47%

	,				
	Sample :	lype:	Wipe		
	Analysis	Date:	9/8/2008		
	Re	egult	Percent Recovery	RPD	Comment
D Block	-0.113	ppm			Acceptable
Preparation Blank	0.2343	рр т	70.3%		Outside Limits
Report Limit Verification Sample	0.2343	pp			
Expected Spike Level (ppm) 0.3333					
Duplicate Sample 1	«Num!	mg/Kg			
Duplicate Sample 2	#Num	mg/Kg		4€лют	#Error
Matrix Spike Analysis					
Spiked Sample			49 64%		Acceptable
Spike Duplicate					Acceptable
Shire Cabusage					

330.278

294 439

Analysis Type:

Calibration Information

Laboratory Control Sample 1

Laboratory Control Sample 2

Correlation of Calabration Curve 11 999768

All calibration verification samples are within acceptance limits.

Notes:

Recovery for the Report Limit Vetification Sample was 70 3%, below the lower control limit of 80%. A passing Report Limit Verification sample for wipe samples for this analysis date can be found with SEG 1654% (119.02% recovery).

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
(81396	81888	1.1
181396	81889	I.1A

SDG Number: 16543

Page 1 of 2

Acceptable

Acceptable

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
[81396	81890	1.2
181396	81891	1.3
181396	B1892	1.4
181396	81893	1.5
181396	81894	L6
181396	81895	L7
181396	B1896	L#
181396	81897	L ⁹
181396	81898	L10
181399	81931	Ģ
181399	81932	10
181399	81933	11
181399	81934	12
181399	81935	13
181399	81936	14
181399	B1937	15

SDG Number: 16543 Page 2 of 1





QC Summary

Sample Delivery Group: 16545

	Analysis Sample I Analysis	урс	Paint Chip 9/8/2008		
	Re	sult	Percent Recovery	RPD	Comment
Prepayation Blank	-0.031	ppm			Acceptable
Report Limit Verification Sample	0 3415	ppm	102 5%		Acceptable
Expected Spike Level (ppm) 0 3333					
Duplicate Sample 1	2791	mg/Kg			
Duplicate Sample 2	2866	mg/Kg		2.64%	Acceptable
Matrix Spike Analysis					h a a a a a a baba
Spiked Sample			90. 15 %		Acceptable
Spike Duplicate			107,33%	17.40%	Acceptable
Laboratory Control Sample 1	212,150	μg	95.65%		Acceptable
Laboratory Control Sample 2	354 206	8 4	97.63%	2 05%	Acceptable

Calibration Information

Currelation of Calibration Curve 6 949835

All calibration verification samples are within acceptance limits.

Notes:

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
181396	81879	51
181346	818RI)	1,5

SDG Numbert

16545

Page Inf 2

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
181396	\$1881	P3
181396	81882	P4
181396	81883	P5
181396	81885	97
181396	81886	PB
181396	81887	[*9
503170	81977	96408-LBP1-TJD
503170	81978	90408-EBP2-TRD
503170	81979	90408-LBP3-TRD
\$03170	21980	90408-LBP4-LID
503170	81981	90408-CBP5-TJD
16 64/ 95	82030	G108050208
166695	82031	GT08090509
182855	82032	1.M 01-Bipc
182955	82033	1 M 02-Green

SDG Number: 16545





QC Summary

Sample Delivery Group: 16542

	Analysis Type:		Flame			
	Sample Type		Air			
	Analysis	Date	9/8/2008	9/8/2008		
	Re	esult	Percent Recovery	RPD	Comment	
Preparation Blank	0.010	ppm			Acceptable	
Report Limit Verification Sample	0.2686	ppm	107 4%		Acceptable	
Expected Spike Level (ppm) 0.25			•			
Duplicate Sample 1	#Num'	mg/Kg				
Duplicate Sample 2	#Nam'	mg/Kg		#Error	#baror	
Matrix Spike Analysis						
Spiked Sample			102 73%		Acceptable	
Spike Duplicate			99.56%	3.14%	Acceptable	
Laboratory Control Sample I	133,956	μg	103.29%		Acceptable	
Laboratory Control Sample 2	120 145	µ€	100 16%	3.07%	Acceptable	

Calibration Information

Correlation of Calibration Curve: 0 909875

All collibration verification samples are within acceptance limits.

Notes:

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
182853	¥1732	94081
182853	81734	84083

SDG Number: 16542

Page 1 of 2

Samples included in this Sample Delivery Group (SDG)

Chain Of Custody	AMA Sample Number	Client Sample Number
182853	81738	84087
182853	81739	84068
503162	81781	OLN-LA-03
503162	81782	QUN-LA-FB1
503158	81797	Iff.N-LA-01
503158	R1798	III.N-LA-FB1
503165	81852	J1N-I A-01
500165	81853	JTN-1 A-FBI
181396	81872	1
181396	81873	2
181396	81874	3
18139#	81913	516-1
181398	81914	516-2
181398	81915	516-3
181394	81923	500-1
181399	81924	5(8)-2
181399	81925	500-3

SDG Number: 16542 Page 2 of 2

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Attention:

Comments

No location given.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

National Guard Bureau Client: Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

State Military Reservation

Havre de Grace, Maryland 21078

Job Location:

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Not Provided Date Submitted: 9/4/2008

Person Submitting: Not Provided

Job Number:

Date Analyzed:

9/8/2008

P.O. Number:

Not Provided

Report Date: 0881876

> 201 TLWAllergenco

> > 150 28

Acceptable

9/10/2008

AMA Sample #	0881875	AMA Sample #
Client ID	208	Client ID
Analyst ID	TLW	Analyst ID
Collection Apparatus	Allergenco	Collection Apparatus
Sample Volume (L)	150	Sample Volume (L)
Analytical Sensitivity (sp/m³)	28	Analytical Sensitivity (sp/m³)
Sample Condition	Acceptable	Sample Condition

	Raw CT.	%	sp/m³		Raw CT.	%	S	p/m³
Alternaria	1	5.9%	28	Alternaria				
Ascospores	3	17.6%	83	Ascospores	6	5.4%		165
Aureobasidium	.			Aureobasidium				
Basidiospores	4	23.5%	110	Basidiospores	42	37.8%		1,160
Bipolaris/Drechslera/Helm.	.			Bipolaris/Drechslera/Helm.	Present		<	28
Boletus				Boletus				
Botrytis	:			Botrytis				
Cercospora			:	Cercospora				
Chaetomium				Chaetomium	Present	!	<	28
Cladosporium			!	Cladosporium	44	39.6%		1,210
Coprinus	:			Coprinus				
Curvularia			·	Curvularia		1		
Epicoccum				Epicoccum				İ
Fusarium				Fusarium	1	0.9%		28
Ganoderma	i i	i		Ganoderma				i
Nigrospora				Nigrospora	Present	-	<	28
Penicillium / Aspergillus	3	17.6%	83	Penicillium / Aspergillus	13	11.7%		358
Pithomyces				Pithomyces				
Rusts				Rusts				
Smuts/Periconia/Myxomycetes	i i	5.9%	28	Smuts/Periconia/Myxomycetes	I	0.9%		28
Stachybotrys		į		Stachybotrys	i			:
Stemphylium	i i	i		Stemphylium				
Trichoderma				Trichoderma				
Torula		!		Torula		:		i
Ulocladium				Clocladium				
Zygomycetes				Zygomycetes				i
Other Colorless	4	23.5%	110	Other Colorless	. 1	0.9%		28
Unknown	1	5.9%	28	Unknown	2	1.8%		55
Hyphal Fragments*		;		Hyphal Fragments*	1			28
			÷	Arthrinium	Present		<	28
		:		Memnoniella	1	0.9%		28
Totals Spore Concentration			468	Totals Spore Concentration				3,060
Location				Location				

An AlHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

Comments

No location given.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Not Provided

Date Submitted:

9/4/2008

State Military Reservation

Havre de Grace, Maryland 21078

Job Number:

Not Provided

Person Submitting:

Attention:

Non-Responsive

P.O. Number:

Not Provided

Date Analyzed:
Report Date:

9/8/2008 9/10/2008

AMA Sample #	0881877
Client ID	OT
Analyst ID	TLW
Collection Apparatus	Allergenco
Sample Volume (L)	150
Analytical Sensitivity (sp/m³)	28
Sample Condition	Acceptable

	Report Date:
AMA Sample #	0881878
Client ID	101
Analyst ID	TLW
Collection Apparatus	Allergenco
Sample Volume (L)	150
Analytical Sensitivity (sp/m³)	28
Sample Condition	Acceptable

•		•					
	Raw CT.	%	sp/m³		Raw CT.	%	sp/m³
Alternaria	3	1.8%	83	Alternaria			
Ascospores	24	14.5%	661	Ascospores	6	8.8%	165
Aureobasidium				Aureobasidium			
Basidiospores	64	38.6%	1,760	Basidiospores	48	70.6%	1,320
Bipolaris/Drechslera/Helm.		:		Bipolaris/Drechslera/Helm.			
Boletus			!	Boletus			
Botrytis				Botrytis			
Cercospora	i i	0.6%	28	Cercospora		1	
Chaetomium	:			Chaetomium	: !	!	
Cladosporium	53	31.9%	1,460	Cladosporium	6	8.8%	165
Coprinus				Coprinus	:		
Curvularia				Curvularia			
Epicoccum	'			Epicoccum			
Fusarium				Fusarium	Present		< 25
Ganoderma	i .	,	i	Ganoderma	i	:	
Nigrospora		1		Nigrospora	1	1.5%	21
Penicillium / Aspergillus	14	8.4%	386	Penicillium / Aspergillus	4	5.9%	110
Pithomyces	Present		< 28	Pithomyces		Ì	
Rusts				Rusts			
Smuts/Periconia/Myxomycetes	4	2.4%	110	Smuts/Periconia/Myxomycete	s 2	2.9%	5:
Stachybotrys	: :			Stachybotrys			
Stemphylium			·	Stemphylium			
Trichoderma	!	!		Trichoderma			
Torula	:	i	i	Tor ula	1		
Clocladium		:		Ulocladium			
Zygomycetes	i ,		į	Zygomycetes	į į		
Other Colorless	2	1.2%	55	Other Colorless			
Unknown	: 1	0.6%	28	Unknown	1 1	1.5%	2
Hyphal Fragments*	1		28	Hyphal Fragments*	:		
my process and management				••	ļ į	:	
Totals Spore Concentration		:	4,570	Totals Spore Concentration	:	!	1,87
Location	i			Location No location give	n	:	

Location

Location N

No location given.

Comments

No location given.

Comments

An AJHA (#100470), NVLAP (101143-0), and NY ELAP (#10920) Accredited Laboratory

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

Spore Trap Analysis Report

Client:

National Guard Bureau

Job Name:

RC 509 Pikesville, MD

Chain Of Custody:

181396

Address:

301-IH Old Bay Lane, Attn: NGB-AVN-SI,

Job Location:

Not Provided

Date Submitted:

9/4/2008

State Military Reservation Havre de Grace, Maryland 21078

Job Number:

Not Provided

Person Submitting:

Attention:

P.O. Number:

Date Analyzed:

9/8/2008

Not Provided

Report Date:

9/10/2008

General Comments, Disclaimers, and Footnotes

Analytical Method:

Sample are analyzed following the instructions and guidelines outlined in AMA Analytical Services, Inc. SOP 901.

Sample Condition:

Acceptable: The sample was collected and delivered to the our location without disturbing the material on the sampling

media.

Unacceptable: 1. The sample is overloaded with material. 2. The sample trace has been disturbed. 3. The sample was

not collected properly.

Obscured: The loading on the sample is high, possibly obscuring spores present. The quantity reported

should be considered the minimum concentration present. The actual concentration may be higher than the

reported concentration.

Spore Notes:

Based on their small size and very few distinguishing characteristics, Aspergillus and Penicillium cannot be differentiated by non-viable sampling methods. There are other types of spores whose morphology is similar to Aspergillus and Penicillium and cannot be differentiated by non-viable sampling methods. Examples of these similar spores are Acremonium, Paecilomyces, Wallemia, and Trichoderma.

Smut, Periconia and Myxomycetes are three different types of organisms that have similar morphological characteristics.

Bipolaris/Dreschlera/Helm: Bipolaris / Dreschlera / Helminthosporium group.

Other Colorless represents all colorless spores that are non-distinctive and unidentifiable.

Hyphal Fragments: A portion of the mycelium that becomes separated from the remainder of the thallus (vegetative body), each of which has the capacity to grow and form new individuals. Results for hyphal fragments

are in fragments/m3 and are not incorporated in the total spore concentration.

Quantification:

Analytical Sensitivity (A.S.): This is dependent on the volume of air collected and the amount of the trace that was analyzed.

The value of "Present" indicated in the Raw Count column represents the presence of this spore type during the preliminary exam at 400x. The Raw Count converts to a whole number if the spore type is encountered again during the 1,000x enumeration. The sp/m³concentration will be reported as less than the analytical sensitivity if

Due to rounding, totals may not equal 100%

"Present" is reported in the Raw Count.

sp/m3: Spores per cubic meter.

Results are reported to 3 significant figures.

Analyst

Sus to Mar O

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client.



SAMPLE CHAIN OF CUSTODY

DATE SHIPPED # OF S	SHIPPED # OF SAMPLES		SAMPLE MEDIA TYPE PROJECT NAME				
	27		Pitesville 181396				
CONTACT			TELEPHONE NUMBER				
CONTACT TO THE STATE OF THE STA							
SAMPLE # OR AREA	SAMPLE DATE	SAMPLE	ANALYSIS REQUESTED				
P9 (Rm 124)	7/30/08	_	Lord (Rint Clip)				
L1 (Kit Cooler		225:.1	Lad vite				
LIA (kil Food Prop		112 132					
L2 (104 ws)		286 in					
L3 (IOI Fla)		149 6	•				
LY (124 Book)		144 8					
15 (206 B Dat)	146 (2					
L6 (208 Locker	(ea	144 1-2					
L7 (200/212 F)		144 i-2					
LB (Range Htr)		142 1-7					
L9 (300 @ 305))	185.250					
LIO Blank		Ø					
and the state of t	Non-	Responsive					
Samples Relinquishe	d By:	e per a de la company	\$/10/08 Date				
Samples Received	By: Signati	ле	, Date				
Samples Analyzed	` '		Date				

Pilasville 2/



SAMPLE CHAIN OF CUSTODY

7/3/08 # OF SAMP	1ES 7.7	SAMPLE MEDIA	TYPE PROJECT NAME 181796
Non-Responsive			TELEPHONE NUMBER
Non-Responsive	A SAME I	SAMPLE	336 465 2558
SAMPLE # OR AREA	SAMPLE DATE	VOLUME	ANALYSIS REQUESTED
Reage	7/2/08	1204.6 L	Lead Air
2 2nd Half		1025.6L	
3 Blank	\ \\ \	Ø L	V
208		150 L	Final Spore
201		150 L	
OT		ISO L	
101	1	1500	↓
Pl (Fluir LOONW)			Lord (Print Chip)
P2 (2010)		,—	
P3 (1-207 und)			
P4 (stain)			
P5 (208 mb)			, '
P6			
P7 (Bala Ra)	La La La La La La La La La La La La La L		
P8 (3rd Labrica)	Non-B	Responsive	.
Samples Relinquished By			,8/10/00 Date
Samples Received By:	Signature		Date
Samples Analyzed By:		•	,
Samples Analyzed By:	Signatun	e	Date

Pikesuille 1/

AMA Analytical Services, Inc. Focused on Result AIHA (#100470) NVLAP (#101143-0) NY ELAP (10920) 4475 Forbes Blvd. • Lanham, MD 20706 (301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643

CHAIN OF CUSTODY

(Please Refer To Tids Number For Inquires)

 ∞ 396

				BEST	AVAILABLE COI	PY	•		
LABORATORY STAFF ONLY: (CUSTODY)				O NY Suite Friable 198.1 O Grav. Reduction ELAP 198.5 O Other (specify SAMPL CLIENT ID SAMPL NUMBER IDEN	TEM Air - Picase Indicate Filter Type: PC MCE Perosity	Asbestos Analysis PCM Ali - Please Indicate Filter Type: PC MCE Porosityin ± 25 D NIOSH 7400(QIV	AFTER HOURS (must be pre-acheduled) I intriodiate Date Due: 124 Hours Time Due: Comments:	1. Client Name: <u>Mariona</u> 2. Address 1: <u>301 − 11</u> 3. Address 2: <u>Hance</u> 4. Address 3: 4. Address 3: <u>The US</u> 5. Phane #: <u>376</u> US	www.amalab.com Mailing/Billing Information:
1. Date/Time RCVD: 2. Date/Time Analyzed: 3. Results Reported To: 4. Comments:		33		198.5 AMPLE	iler Type: in a 25pm 37mm (QIY) (QIY) (QIY) (QIY) (QIY)	lter Type: in ± 25mm 37mm (QTY)		10 Gene 1	
0 10 10 8 9 10 10 10 10 10 10 10 10 10 10 10 10 10		1 La Contraction		VOLUME WI	O Qual (pres/abs) O Quan (s/area) V O Quan (s/area) O D Qual (pres/abs) O Qual (pres/abs) O EPA 100.1	IEM Bulk □ ELAP 198,4/Charleid □ NY State PLM/TEM_ □ Residual Ash	NORM NORM Day Day Day Day Day Dake Due.	Hant 21078 Fax # 704 573 1650	
® By (Print)				SESX7	Vacuum/Dust	.#Chadieid(QTY) PLM/TEM(QTY) Ish(QTY)	CH DS CONTROLL OF THE STREET O	2. Job Location: 3. Job #: 4. Contact Person 5. Submitted by	Sybnical Informations
TEISTAN WAYED				SPOKE 12.10	(QTY) (QTY) Mole	Į.	GRS GResults Required By Noon (Every Attempt Will Be Made to Accomodate) O	C SOA Vikesuille	
(1/1-)/5 6 AMI/ /_12 / CB Time	Date: () 200	Date/Time:	Date Tine:	Surface Swab	TCLP	Lead Analysis Dennit Crup Dost Wipe (wipe ape And And Application C Soil/Stild (QTY)	A CONTRACTOR	PO # Signature	
Sign C 177	Configer		Contact: B	(QTY Q Bulk (QTY)((TY) Cl Surface Vacuum Dust(QTY) Cl Other (Specify) CLENI CONTACT(LABORATORY STAFF ONLY)	OTFO OTFO	(QTY)	REPORTTO: Cam Shoots with Report is E. J. (o.	855 5h 35h	
MI	B 6	By	By:	OLY, OLY,	(QTF)			The state of the s	



www.analyticallab.com

Industrial Hygiene Survey

National Guard Facility Pikesville Military Reservation 610 Reisterstown Road Pikesville, MD 21208

Prepared For:

National Guard Bureau Region North IH

301-IH Old Bay Lane

Havre de Grace, MD 21078

Survey Location:

Pikesville Military Reservation

610 Reisterstown Road Pikesville, MD 21208

Prepared By:

Analytical Laboratory Services, Inc.

3544 North Progress Avenue

Suite 100

Harrisburg, PA 17110

Survey Date:

July 9, 2010

Report Date:

August 23, 2010

ALSI Project #:

1007423

Non-Responsive

Director, Environmental Health & Safety

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Table of Contents Section 1.0 Executive Summary 3 Section 2.0 Operation Description & Observations 4 Section 3.0 Noise Survey 5 Section 4.0 Lead Testing 6 Section 5.0 Lighting 8 Section 6.0 Indoor Air Quality 9 Section 7.0 Suspect Asbestos Containing Building Materials 11 Section 8.0 Maintenance Bay 12 Section 9.0 Limitations 13 Appendix A. Laboratory Analysis Report 14 Appendix B. Photographs 15 Appendix C. Floor Plan 16 Appendix D. References 17

Section 1.0 Executive Summary

Section 1.0 Executive Summary

An industrial hygiene survey was conducted July 9, 2010, at the Pikesville Military Reservation located at 610 Reisterstown Road, Pikesville, Maryland 21208-4765. The study was performed by Mr. Non-Responsive CIH.

- 1. Surface levels of lead exceeded 200 ug/ft2 in the following locations:
 - a. Armory Old Firing Range Painted Ledge
 - b. Armory Old Firing Range Light
 - c. Armory Second Floor Room 205 Bookshelf
 - d. Armory Third Floor Brown Painted Floor in Hallway

Housekeeping and cleaning should be improved to maintain lead levels below 200 ug/ft².

- 2. Lighting levels did not meet the minimum recommended guidelines in the following areas: 1) Drill Hall, 2) Kitchen, 3) Admin Building Training Room 4) Construction Building Work Bays. Lighting should be improved in these areas.
- 3. Relative humidity exceeded the recommended ceiling of 60% in one location and temperature exceeded the recommended criteria of 79 degrees F in all locations. There is no central air conditioning system in this building.
- 4. A visual inspection was conducted throughout accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ.
 - a. A few water damaged ceiling areas were observed. Active or current water infiltration was observed in the 3rd Floor Honor Guard Area of the Armory.
 - b. All sources of water infiltration should be identified and repaired. Water damaged ceiling and building materials should be removed and replaced. Some water damaged building materials may contain asbestos and should be handled properly.

Section 2.0 Operation Description & Observations

Section 2.0 Operation Description & Observations

The Pikesville Military Reservation consists of three main buildings: 1) Armory 2) Administrative Building 3) Construction Shop. There are numerous smaller buildings present. Most are unoccupied and serve as storage areas or administrative areas on drill weekend or for designated occasions. The Armory and Administrative Building are primarily office settings and equipment storage facilities. There are offices, drill hall, garage, and storage areas. There are nineteen full time occupants. Other occupants are present on drill weekends or depending upon duty requirements. The Construction Section is occupied by one full time administrative person. Workers from this area travel to the various MD ARNG facilities and perform various construction and maintenance tasks.

The armory was initially constructed in 1938. It is a large three story stone building that is mostly unoccupied. There have been several renovations and additions to the building since it was first built. The drill hall is on the first floor. The second floor is vacant. The third floor is occupied by the Honor Guard in one section. The exterior of the building is stone/masonry.

The heating, ventilating, and air conditioning system (HVAC) consisted of a few window unit air conditioners and a boiler with radiators. Outdoor air ventilation occurs via open windows, doors, etc. No forced-air ventilation system is present in any of the buildings. The armory floors were composed of a poured concrete slab. Administrative areas have a suspended drop ceiling system.

There is an old firing range in the second floor of the armory building. It has been completely abated, It is empty. There is no childcare facility in this building.

Site personnel at the time of the site assessment consisted of seven administrative personnel and twelve maintenance personnel. The employees on site were conducting general administrative work or building maintenance.

Overall housekeeping was good. Areas were clean and well kept.

No ergonomic concerns were reported. Office areas have computer work stations. Work stations appeared properly designed. Personnel had supportive chairs. One work station in the construction shop had the monitor lower than recommended.

Two buildings were closed and could not be surveyed. They were the NCO club and the MD Defense Building.

Section 3.0 Noise Survey

Section 3.0 Noise Survey

Employees were not performing tasks that provided excessive noise levels, as such; noise exposure monitoring was not conducted.

Section 4.0 Lead Testing

Section 4.0 Lead Testing

At the time of the assessment, no activities were observed which would generate lead exposure. Soldiers reportedly clean rifles sometimes during drill weekends. The facility contains an unoccupied room which was once an indoor firing range. It is now an empty room.

Various surfaces within the facility were screened for lead using surface/wipe samples. Surface/wipe samples were collected using Ghost WipeTM samples and were collected in accordance with the ASTM E 1792 protocols. Air samples were collected using 0.8 um mixed cellulose ester (MCE) filter cassettes attached to low volume air sampling pumps. Blank samples were submitted to the laboratory for quality control purposes. Samples were sent to AMA Analytical Services, Inc., in Lanham, Maryland, for lead analysis using EPA Method 600/R-93/200 (M)-7420. A copy of the laboratory analysis report can be found in Appendix A.

Lead Testing Results Summary

Sample #	Location	Air ug/m³	Surface ug/ft²	Paint Chip %Pb
1	Assembly Hall - Main Armory Classroom 1	<4,4		
2	Assembly Hall - Main Armory Drill Hall	<4.5		
3	Blank	<3		
4	Armory Old Firing Range Painted Ledge		220	
5	Armory Old Firing Range - Floor		<i10< td=""><td> </td></i10<>	
6	Armory Old Firing Range - Light		2,900	
7	Armory Outside Old Firing Range Floor		<110	
8	Annory Second Floor Room 209 Bookshelf		<110	
9	Armory - Second Floor Room 205 Bookshelf		440	
10	Armory – Third Floor Brown Painted Floor in Hallway		1,400	
11	Armory Honor Guard Office Break Table	•	<110	
12	Armory Kitchen – Food Prep Table	<110		· · · · · · · · · · · · · · · · · · ·
13	Armory Assembly Hall Floor (Red)	170		
14	Admin, Bldg, Large Training Room – Window Sill	<110		
15	Admin, Bldg. – Front Lobby Window Sill		<110	
16	Armory – Peeling Paint in Stairwell			0,23

Sample #	Location	Air ug/m³	Surface ug/ft²	Paint Chip %Pb
17	Blank		<12	
18	Construction Shop – Break Table in Shop Area		<110	
19	Assembly Hall Room 122A Mess Hall Table		<110	
20	Assembly Hall – Classroom 4 Floor		<110	
21	Assembly Hall – Front Entrance Window Sill		120	
Criteria		50	200	0.5

Key: Bolded results exceed listed criteria

Surface levels of lead exceeded 200 ug/ft² in the following locations:

- 1. Armory Old Firing Range Painted Ledge
- 2. Armory Old Firing Range Light
- 3. Armory Second Floor Room 205 Bookshelf
- 4. Armory Third Floor Brown Painted Floor in Hallway

The National Guard Bureau currently utilizes 200 ug/ft² as a benchmark for identifying lead-contaminated surfaces. In the "Derivation of Wipe Surface Screening Levels for Environmental Chemicals," the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) has determined that 200 ug/ft² is a satisfactory surface contamination level unless the facility is utilized as a childcare facility. In such cases, U.S. Department of Housing and Urban Development (HUD) limit of 40 ug/ft² on floors and 250 ug/ft² on windowsills should be observed. There is no child care provided at this facility.

Air samples for lead were below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit of 50 ug/m³. In fact, no detectable level of lead was identified in the air sample collected.

Deteriorated paint was observed in a few locations throughout the facility. Overall, the painted surfaces were in good condition. Delaminated paint was mostly due to age along with prolonged exposure to elevated relative humidity levels. A paint chip sample was collected from the Armory Stairwell. Low levels of lead were detected in the sample collected. However, the result was less than the HUD definition of lead-based paint (0.5%).

Housekeeping and cleaning activities should be improved to maintain surface lead dust concentrations below 200 ug/ft². Deteriorated and peeling paint should be properly remediated and repaired.

Section 5.0 Lighting

Section 5.0 Lighting

A lighting assessment was conducted throughout the facility. Measurements were collected using a Cooke Cal-Light 400L Precision Light Meter (Serial No. K070003). The light meter was last calibrated on November 26, 2009. Measurements collected were compared to ANSI/IESNA RP-7-01 Lighting Industrial Facilities and RP-1-04 Office Lighting.

Light Survey Assessment Summary

Location	Foot Candles	Recommended Lighting	Sufficient Lighting
Armory - Drill Hall	18 - 24	30-50	No
Armory – Kitchen	38.3	50	No
Armory - Second Floor Hall	37.3	5	Yes
Armory - Third Floor Honor Guard Office	102.4	30-50	Yes
Armory – Third Floor Weight Room	159.6	30	Yes
Armory - Stairwell	97.2	5	Yes
Armory First Floor Men's Latrine	60.4	5	Yes
Armory - Classroom 1	88.1	30-50	Yes
Admin, Building - Lobby	11.3	5	Yes
Admin. Building Office/Copier Area	90,3	30-50	Yes
Admin. Building Office 10	49.8	30-50	Yes
Admin. Building - Large Training Room	14.2	30-50	No
Admin, Building Second Floor HHS Orderly Room	88.7	30-50	Yes
Armory - Info Tech Office	89.7	30-50	Yes
Construction Office	127.0	30-50	Yes
Construction - Work Bays	27.0	75	No
Separate Building Break Area	53.7	30-50	Yes

Key: Bolded results are less than the listed criteria

Lighting levels did not meet the minimum recommended guidelines in the following areas: 1) Drill Hall, 2) Kitchen, 3) Admin Building Training Room 4) Construction Building Work Bays. Lighting should be improved in these areas.

Section 6.0 Indoor Air Quality

Section 6.0 Indoor Air Quality

Survey measurements were made for ventilation and comfort parameters (carbon dioxide, temperature, and relative humidity). The air quality measurements were collected using direct reading instrumentation for comfort parameters using a QTRAK IAQ Meter, Model 7565X (Serial # 0839020). The IAQ Meter was last calibrated in March 2010.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) have developed indoor air quality guidelines for mechanically ventilated office buildings and commercial settings (ASHRAE standard 62.1-2007). ASHRAE specifies temperature and relative humidity ranges for human comfort (ASHRAE 55-2004). The US Army Technical Guide 277 Army Facilities Management Information Document on Mold Remediation, recommends maintaining a relative humidity range between 30 to 60% in occupied areas.

The recommendations for temperature and humidity are based on seasonal and regional influences to allow comfort for 80% of a building's population. The temperature readings from the interior ranged from 79.8 to 89.5 degrees F with relative humidity readings ranging from 29.8% to 67.3%. During the survey, carbon dioxide (CO₂) levels ranged from 383 ppm to 765 ppm within the facility compared to an outdoor CO₂ level of 388 ppm. Based on the outdoor levels observed at the time of the testing, the maximum indoor concentration of CO₂ recommended is 1,088 ppm (388 ppm = 700 ppm). The results of the testing met the ASHRAE guidelines. The following table summarizes the measurements collected.

IAQ Assessment Summary

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Armory - Assembly Hall	87.7	61.4	383	0
Annory Kitchen	85.7	63.0	410	0
Armory Second Floor Hall	86.5	67.3	480	0
Armory Third Floor Honor Guard Office	88.7	59.1	450	0
Armory Third Floor Weight Room	89.5	54.7	470	0
Armory Stairwell	86.7	58.7	5 05	. 0
Armory - Classroom I	86.8	58.6	451	0
Admin. Building - Lobby	79.8	47.5	521	. 0
Admin. Building · Office/Copier Area	78.9	51.9	576	0
Admin. Building - Office 10	80.2	57.0	762	0
Admin. Building - Large Training Room	81.3	54.6	521	. 0
Admin. Building - Second Floor IIIIS Orderly Room	83,9	58.7	554	0

Location	Temperature (°F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)
Armory – Info Tech Office	83.7	61.8	429	0
Construction Office	79.8	53.7	458	0
Construction – Work Bays	81.2	61.7	501	0
Outdoors	90.0	60.1	388	0
Separate Building – Break Area	84.0	29.8	765	-
Criteria	73.0-79.0	30-60	<1,088	<9.0

Key: Bolded results exceed listed criteria

Relative humidity exceeded the recommended ceiling of 60% and temperature exceeded the recommended criteria of 79 degrees F in some locations. There is no central air conditioning system in these buildings. There are some window air conditioners present. Outdoor conditions were hot and humid. Relative humidity should be maintained at 30-60%. Low relative humidity can lead to the drying of mucous tissues and an increased susceptibility to respiratory infection. High relative humidity can provide an environment suitable for microbial growth and proliferation.

A visual inspection was conducted throughout visually accessible portions of the facility. The visual inspection was conducted to assess sources or pathways of factors potentially deleterious to IAQ. The visual inspection revealed the following items that may be potential sources of poor IAQ:

- 1. A few water damaged ceiling areas were observed. Active or current water infiltration was observed in the 3rd Floor Honor Guard Area of the Armory.
- 2. No areas of extensive fungal growth were observed. Areas such as above ceilings were inaccessible and could not be inspected.

All sources of water infiltration should be identified and repaired. Water damaged ceiling and building materials should be removed and replaced. Some water damaged building materials may contain asbestos and should be handled properly.

Section 7.0 Suspect Asbestos Containing Building Materials

Section 7.0 Suspect Asbestos Containing Building Materials

Suspect asbestos containing materials (ACM) include sheetrock/joint compound, plaster wall and ceiling systems, floor tiles and associated mastic, and vinyl covebase. Thermal system insulation which is most likely a combination of paper wrapped fiberglass with PVC elbows and well as pre-formed TSI with mudded elbows was suspected. No samples were collected.

The only suspect ACM that had the potential to cause concern was the areas of the 3rd floor of the Armory where extensive water damage was present in the ceilings. Water leaks in these areas should be repaired. If ACM is damaged appropriate action should be taken.

Section 8.0 Maintenance Bay

Section 8.0 Maintenance Bay

There is a separate building that houses the Construction Section. The Construction Section is occupied by one full time administrative person. Workers from this area travel to the various MD ARNG facilities and perform various construction and maintenance tasks. Maintenance activities are no longer performed in this area. It is used primarily for storage of equipment and supplies. It was not apparent that any special clean up activity has been performed.

There are also two local exhaust ventilation (LEV) trunks present which were previously used to remove vehicle exhaust from the building. The vehicle exhaust ventilation system was inoperable at the time of this survey so no ventilation measurements could be performed. LEV used for vehicle exhaust should be repaired and utilized if vehicle maintenance activity occurs that involves operation of vehicles inside the building.

Section 9.0 Limitations

Section 9.0 Limitations

This report summarizes our evaluation of the conditions observed at the above referenced tocation. Our findings are based upon our observations and sampling results obtained at the facility at the time of our visit. The report, results, and subsequent recommendations reported herein are also limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation.

This report is intended for the exclusive use of the client. This report and the findings herein shall not, in whole or in part, be relied upon by any other parties, disseminated or conveyed to any other party without prior written consent of the National Guard Bureau, and Analytical Laboratory Services, Inc. The findings are relative to the dates of our site visits and should not be relied upon for substantially later dates.

Appendix A Laboratory Analysis Report

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS





Job Name: 301-IH Old Bay Lane, Aftn: NGB-AVN-SI, Havre de Grace, Maryland 21078 State Military Reservation National Guard Bureau Attentions Address: Client:

Chain Of Custody: Person Submitting: Date Submitted: Date Analyzed: Pikesville Military Reservation W912K6-09-A-0003 Pikesville, MD Not Provided P.O. Number: Job Location: Job Number;

Page 1 of 2

7/23/2010

Report Date:

7/21/2010

7/14/2010 508279

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Cilent Sample Namber	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft²)	Rep	Reporting Limit	Total ug	Figal Result	ä	Comments
1060189	1007423-1	Flame	Air	684	N/A	4.4	ug/m³	₹ ₹	4.40	ug/m²	
1060190	1007423-2	Flame	Air	664	N/A	4.5	ug/m²	7	<u>4.5</u>	ug/m³	
1060191	1007423-3	Flame	Air Blank	0	N/A	ćЛ	ug/m³		Δ.	ßn	
1060192	1907423-4	Hame	Wipe	***	0.108	110	ug/ft²	24	220	ng/ff²	
1060193	1007423-5	Flame	Wipe	***	0.108	110	ng∕ff²	<12	<110	ug/ft²	
1060194	1007423-6	Flams	Wipe	***	0.108	110	ug/ff²	310	2900	ug/ff?	
1060195	1007423-7	Flant	Wipe	***	0,108	110	ug/II*	<12	0110	ug∕ff²	
1060196	1007423-8	Flame	Wipe	**	0.108	110	ug/ft²	<12	<110	ug/ff²	
1060197	1007423-9	Flame	Wipe	**	0.108	110	ng∕Ĥ²	47	440	ug/¶²	
1060198	1007423-10	Flame	Wipe	****	0,108	110	118/Us	150	1400	11g/∰²	
6610901	1007423-11	Flame	Wipe	***	0.108	110	ug/ff²	<12	<110	ng∕អិ²	
1060200	1067423-12	Flame	Wipe	***	0.108	110	₁JJ/Sin	<12	<116	ng/ff²	
1060201	1067423-13	Flanc	Wipe	***	0.108	110	ng/A²	18	170	ng/ff²	
1060202	1007423-14	Plane	Wipe	****	0.108	110	ng∕ft²	<12	<110	ng/ff²	
1060203	1007423-15	Flame	Wipe	***	0.108	911	ug/A²	~ []3	<110	ug/ff²	
1060204	1007423-16	Figne	Paint Chip	****	N/A	0.011	%P6		0.23	%P\$	
1060205	1067423-17	Ffanse	Wipe Blank	****	N/A	13	ĝii		<12 <12	ân	
1060206	1007423-18	Еризе	Wipe	****	90.108	110	ug/ff²	<12	<110	ug/ff²	
1060307	1007432 10	Diame	Wine	****	0 108	110	10000	<12	7	32 /H2	

locations, and collection protecots are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of their information. Residuals sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the effect. NVLAP accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AUERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NY ELAP, AIHA, NVLAP, or any agency of the Federal Government. All submitted and accepted for the exclusive use of the client to when it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, rights reserved. AMA Analytical Services, Inc.

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A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS



NY ELAP	
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5082.79

Chain Of Custody:

Pikesville Military Reservation

Pikesville, MD

Job Location:

301-JH Old Bay Lane, Attn: NGB-AVN-SI,

National Guard Bureau

State Military Reservation

Job Names

Date Submitted:

7/14/2010

0102/12/2

7/21/2010 Report Date:

Person Submitting: Date Analyzed:

W912K6-09-A-0003

P.O. Number:

Not Provided

Job Number:

Havre de Grace, Maryland 21078

age 2 of 2

Summary of Atomic Absorption Analysis for Lead

Comments			control samples wipe, and soil
ult	<110 ug/ft²	ug/ft²	s of quality paint chip,
Final Result	9 ₹	120	yfical result: pes. plies only to
Total ug	<12	13	See QC Summary for analytical results of quality control samples associated with these sampes. NY ELAP accreditation applies only to paint chip, wipe, and soil samples.
Reporting Limit	ug/ff²	ng/ff²	See QC (associate NY ELAP samples.
	110	110	11B #-3113B (ppm)
Area Wiped (ft²)	0.108	0.108	Water SM-31- 421; Water: Sh earls per million
Air Yolume (C.)	****	****	EPA 600/R-93/200(M)-7420; Water: SM-311B is: EPA 600/R-93/200(M)-7421; Water: SM-31 dry weight basis mg/L = parts per million (ppr
Sample Type	Wipe	Wipe	olids: EPA 600/R /Solids: EPA 60) on a dry weight
Analysis Type Sample Type	Flame	Flame	: Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7420; Water: SM-3111B cc. Air, Wipes, Paints, and Soil/Solids: EPA 600/R-93/200(M)-7421; Water: SM-31138 mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm)
Ctient Sample Number	1007423-20	1007423-21	Flame: Air, Wipes, Paints, and Soil/Soilds: EPA 600/R-93/200(M)-7420; Water: SM-3111B Furnace: Air, Wipes, Paints, and Soil/Soilds: EPA 600/R-93/200(M)-7421; Water: SM-3113B mg/Kg = parts per million (ppm) on a dry weight basis mg/L = parts per million (ppm)

ug/L = parts per billion (ppb)

ug = micrograms

Note; All samples were received in good condition unless otherwise noted. Note: All results have two significant digits. Any additional digits shown

%Pb = percent lead on a dry weight basis

N/A = Not Applicable

1066208 1050209

AMA Sample

Number

Affeution:

Analysis Method for Flame: Air, Analysis Method For Furnace: Air and Wipe results are not corrected for any blank results

should not be considered when interpreting the result.

Final results for air and wipe samples are based on client

supplied information nor verified by this laboratory.

change unless signed by the Technical Director or Deputy. All results are to be considered preliminary and subject to

Analyst: Nida McGarrey

G Edward Camey Technical Manager:

locations, and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personned of these Laboratories, or expressly disclaim any throughous provided by the appropriate regulatory guidelines, to the citiens, and the citiens of the convergence and the citiens of the configuration approach of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the citiens of the reserved. AMA Analytical Services, Inc.

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to check in the public, and these Laboratories, this report is and accepted for the exclusive use of the clean to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written antiburization from us. Sample types,

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