National Guard Region North

National Guard Readiness Center
Industrial Hygiene Evaluation
Washington D.C. Armory
Washington D.C., 20003

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. 1061-14
October 12, 2012

Bonus Environmental, LLC

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October 12, 2012
Project No. 1061-14

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

Attn: Non-Responsive

Project: Industrial Hygiene Evaluation
Washington D.C. Armory

1.0 - EXECUTIVE SUMMARY

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North Industrial Hygiene office to identify and measure the existence and extent of potentially hazardous operations or conditions at the Washington D.C. Armory located at 2001 E. Capital Street in Washington D.C., 20003. 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 conditions were evaluated during this industrial hygiene evaluation performed by Bonus Environmental, LLC representatives Non-Responsive and Non-Responsive on September 24, 2012:

- Indoor Air Quality
- Lead Wipe & Bulk 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 Washington D.C. Armory is an Army National Guard armory comprised of offices, classrooms, locker rooms, storage rooms, a drill hall, a gym, bunk rooms, break rooms, and conference rooms. The point of contact for the approximately 588,000 ft² Washington D.C. Armory is SPC James Harrison. Two hundred fifty eight (258) full-time administrative personnel and eleven (11) maintenance personnel are employed at the Washington D.C. Armory. A shop diagram depicting the locations of the operations identified during this industrial hygiene evaluation is not provided, as the floorplans provided to Bonus Environmental, LLC are so large that they aren't able to be reduced to a reasonable size and remain readable.

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.

2.0 – LEAD SAMPLING

2.1 – Lead Wipe Sampling

Lead wipe sampling was performed according to the Environmental Protection Agency (EPA) method 600/R-93/200(M)-7420 (Atomic Absorption - Flame). Nineteen (19) wipe samples and one (1) field blank were sent under chain-of-custody procedures to AMA Analytical Services, Inc., an American Industrial Hygiene Association (AIHA) accredited laboratory located in Lanham, Maryland. The U.S. Department of Labor (USDOL) and the Occupational Safety and Health Administration (OSHA) do not have a promulgated standard for lead surface contamination; however OSHA has provided an interpretive level of 200 micrograms per square foot (µg/ft²) to assess the housekeeping requirements of "as free as reasonably practicable". This interpretation is presented in OSHA Industrial Hygiene Technical Manual (TED 01-00-015; 1/20/1999), and in a letter of interpretations dated 1/13/2003, and subsequently issued to public domain. NG Pam 420-15 addresses the conversion and remediation of former indoor firing ranges. The following table outlines the locations and analytical results for the lead wipe samples collected during this project

Army National Guard – Washington D.C. Armory
Lead Wipe Sample Results

Sample #	*Sample Date*	*Sample Location*	*Sample Area (ft^2)*	*Sample Result ($\mu g/ft^2$)*
DCA-LW-1	9-24-12	Field Blank	---	< 12 μg
DCA-LW-2	9-24-12	Room 108 E, on window sill	0.111	240
DCA-LW-3	9-24-12	Basement level, NW section, hallway outside of clinic, on top of blood pressure machine	0.111	< 110
DCA-LW-4	9-24-12	Room 12-E, on top of fan blade	0.111	< 110
DCA-LW-5	9-24-12	Drill Hall, on floor, center-east	0.111	< 110
DCA-LW-6	9-24-12	Drill Hall, on floor, center-west	0.111	< 110
DCA-LW-7	9-24-12	Drill Hall, SW section, on portable basketball hoop	0.111	240
DCA-LW-8	9-24-12	Drill Hall, NW section, on top of cash register	0.111	< 110
DCA-LW-9	9-24-12	Drill Hall, NE section, on seat in red section	0.111	< 110
DCA-LW-10	9-24-12	Outside of Room D-IT-N, on top of pay phone	0.111	120
DCA-LW-11	9-24-12	Former Indoor Firing Range, on floor, east end	0.111	40,000
DCA-LW-12	9-24-12	Former Indoor Firing Range, on floor, bullet trap area	0.111	490,000
DCA-LW-13	9-24-12	Hallway, across from Room 117-1B-E, on top of fire extinguisher cabinet	0.111	< 110
DCA-LW-14	9-24-12	Room 110-6-A, NE section, on top of file cabinet	0.111	< 110
DCA-LW-15	9-24-12	Near Room 203-N, on top of Coca Cola machine	0.111	690
DCA-LW-16	9-24-12	4th Floor hallway, near Room 404-N, on top of water fountain	0.111	< 110
DCA-LW-17	9-24-12	2nd Floor West side hallway, near Room 205-W, on top of	0.111	< 110

Army National Guard – Washington D.C. Armory *Lead Wipe Sample Results*				
Sample #	***Sample Date***	***Sample Location***	***Sample Area (ft^2)***	***Sample Result ($\mu g/ft^2$)***
		defibrillator case		
DCA-LW-18	9-24-12	Room 302-W, on NW window sill	0.111	260
DCA-LW-19	9-24-12	Room 211-S, on SW window sill	0.111	3,400
DCA-LW-20	9-24-12	Hallway, outside of Room 109-S, on top of brochure's table	0.111	< 110

Surface cleanliness threshold = < 200 micrograms per square foot (µg/ft²)

The former indoor firing range is currently used for storage. It is uncertain whether it was remediated to the protocols specified in NG Pam 420-15. Remediation wipe sample results were not posted, nor were any signs posted restricting access to the area. The bullet trap was not still in the "bullet trap area".

3.0 - PHYSICAL CONDITION OF FACILITY / PERSONNEL CONCERNS

3.1 - Lead Based Paint

During the industrial hygiene evaluation of the Washington D.C. Armory, 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. Bonus Environmental, LLC identified peeling blue paint in the ground floor, east hallway, and peeling white paint in the Boiler room, on the upper west wall. Two (2) paint chip samples was collected and sent under chain-of-custody procedures to AMA Analytical Services, Inc., an AIHA accredited laboratory located in Lanham, MD. Analysis indicated that both of the peeling paints collected contained detectable levels of lead. The paints are therefore considered to be lead-based paint. The OSHA Lead in Construction Standard, 29 CFR 1926.62 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. Housing and Urban Development (HUD) defines lead based paint as having greater than 0.5% lead by weight. Paint chip sample results are attached to this report as Appendix A.

3.2 – Presumed Asbestos Containing Materials

During the industrial hygiene evaluation of the Washington D.C. Armory, 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 Washington D.C. Armory, Bonus Environmental, LLC performed a visual inspection to report the location and perform an evaluation of any water damaged or visible mold problems. Bonus Environmental, LLC identified approximately 8 ft² of water-damaged dropped-ceiling tiles, and approximately 60 ft² of moldy drywall located in Room 119 (Maintenance Room). In addition, it was noted that Room 12-W was labeled with signs as "Microbial

Hazard". Room 12-W was stripped of it's walls to the studs on it's perimeter wall, and had water-stained carpeting.

3.4 - Housekeeping

During the industrial hygiene evaluation of the Washington D.C. Armory, Bonus Environmental, LLC performed an evaluation of the housekeeping practices. Bonus Environmental, LLC found the housekeeping practices within Washington D.C. Armory facility in good order.

3.5 – Employee Interviews

During the industrial hygiene evaluation of the Washington D.C. Armory, 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.

3.6 – Indoor Air Quality

During the industrial hygiene evaluation of the Washington D.C. Armory, Bonus Environmental, LLC measured temperature, relative humidity, carbon monoxide (CO), and carbon dioxide (CO_2) throughout the facility. A calibrated TSI Q-Trak Plus Model 8554 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 CO_2 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 CO_2 concentrations can be found near vehicle traffic areas, industry and sources of combustion. The concentrations of CO_2 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 CO_2 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 62.1-2010, CO_2 concentrations below 700 ppm above the outdoor level are considered to indicate adequate ventilation and provide human comfort. The CO_2 measurements collected during this industrial hygiene evaluation ranged from 368 ppm to 684 ppm and indicate adequate ventilation within the facility.

Carbon monoxide 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 permissible exposure limit (PEL) of 50 parts per million (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 0.0 ppm to 0.8 ppm. CO levels were well below the OSHA PEL during this industrial hygiene evaluation.

During the industrial hygiene evaluation of the Washington D.C. Armory, Bonus Environmental, LLC collected temperature measurements. Temperature measurements throughout the common areas of the facility routinely occupied by employees ranged from 68.7ºF to 74.1ºF and are considered to be within an acceptable range outlined within ASHRAE Standard 55-2010.

During the industrial hygiene evaluation of the Washington D.C. Armory, Bonus Environmental, LLC collected relative humidity measurements. Relative humidity measurements throughout common areas of the facility routinely occupied by employees ranged from 28.3% to 45.3%. Indoor air quality measurements recorded during this industrial hygiene evaluation are summarized in the table below.

Army National Guard – Washington D.C. Armory
Indoor Air Quality Measurements

Location	*CO_2 (ppm)*	*CO (ppm)*	*Relative Humidity (%)*	*Temperature (ºF)*
Outdoors, South side of building	368	0.4	28.3	71.1
Basement level, Boiler Room	408	0.5	32.2	72.5
Ground floor, Gym Room 19-N	470	0.8	45.3	69.8
Ground floor, 12-W	390	0.5	32.4	68.7
1st floor, West lobby	527	0.3	37.1	72.5
1st floor, Center of Drill Hall	386	0.6	32.7	72.5
2nd floor, Room 209-N	684	0.5	43.8	73.0
2nd floor, Room 208-E	579	0.7	37.9	74.1
3rd floor, Room 213-T-S, Unisex Restroom	424	0.5	35.2	73.4
3rd floor, Room 209-S, Classroom	403	0.8	32.5	69.6
3rd floor, Room 302-W, Classroom	429	0.0	38.5	72.9

Required/Recommended Values
CO_2 *- OSHA PEL = 5,000 parts per million (ppm) and ASHRAE Standard 62.1-2010 = no greater than 700 ppm above outdoor*
CO *- OSHA PEL = 50 ppm and OSHA Ceiling Limit = 200 ppm*
Temperature *- ASHRAE Standard 55-2010 = between approximately 67 and 82 °F.*
RH *- ASHRAE Standard 62.1-2010 = limited to* < 65%

4.0 – LIGHTING

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

Army National Guard – Washington D.C. Armory
Lighting Measurements

Location	*Measurement in Foot Candles*	*Requirement in Foot Candles*	*Requirement Met?*
012-5-E (Office)	65.3	50	Yes
012-E (Office)	114.5	50	Yes
011-4-E (Office)	33.6	50	No
011-E (Office)	40.1	50	No
13-G-S (Boiler Room)	2.9	30	No

Army National Guard – Washington D.C. Armory *Lighting Measurements*			
Location	*Measurement in Foot Candles*	*Requirement in Foot Candles*	*Requirement Met?*
C-01-S (Hallway)	81.4	5	Yes
021-5-S	Inaccessible		
025-S (Café)	53.1	10	Yes
025-1-S (Kitchen)	114.6	50	Yes
021-S (Office)	42.3	50	No
019-S (Office)	59.1	50	Yes
35-1A-S (Storage)	24.4	30	No
35-S (Storage)	21.3	30	No
34-S (Office)	36.9	50	No
33-S (Locker Room)	35.0	7	Yes
32-S (Recruiting Center)	11.0	50	No
C-03-S (South Lobby)	10.4	10	Yes
21-S (Office)	25.2	50	No
17-S (Lobby)	24.5	10	Yes
1-17-4-S (Conference Room)	21.2	30	No
16-T-S (Women's Restroom)	22.4	5	Yes
15-4A-S (Office)	15.2	50	No
C-05-W (Hallway, ground floor west)	11.6	5	Yes
18-W (Office)	9.4	50	No
15-W (Office)	157.0	50	Yes
13-W (Range)	Lighting Inoperable		
11-A-W (Range)	18.9	150	No
12-W (Storage)	22.5	30	No
19-N (Gym)	40.1	30	Yes
Gym, Women's Restroom/Locker Room	24.0	7	Yes
Gym, Men's Restroom/Locker Room	52.7	7	Yes
20-N (Spinning Room)	14.6	30	No
C-02-N (Hallway)	3.9	5	No
11-N (Range)	9.4	150	No
C-03-E (Hallway)	19.3	5	Yes
9-13-E (Chapel)	17.1	30	No
16-E (Storage)	16.6	30	No
013-6	Inaccessible		
101-E (Office)	16.3	50	No
105 (Office)	36.5	50	No
109 (Conference Room)	36.2	30	Yes
111 (Office)	64.1	50	Yes
115 (Office)	32.2	50	No
119 (Maintenance Room)	34.7	30	Yes
121 (Office)	21.2	50	No
123 (Office)	73.2	50	Yes
129 (Men's Restroom)	23.4	5	Yes
130 (Women's Restroom)	14.2	5	Yes
131 (Lab)	19.6	150	No
132 (Office)	82.8	50	Yes
103C (Office)	84.1	50	Yes
117-1B-E (Conference Room)	45.2	30	Yes

Army National Guard – Washington D.C. Armory *Lighting Measurements*			
Location	*Measurement in Foot Candles*	*Requirement in Foot Candles*	*Requirement Met?*
116-E (Hallway)	28.8	5	Yes
116-D-E (Office)	43.1	50	No
113-A-E (Copy Room)	74.2	10	Yes
116-2-A-E (Conference Room)	50.7	30	Yes
109-E (Office)	56.4	50	Yes
108-E (Office)	24.1	50	No
106-E (Office)	12.7	50	No
106-4-8 (Office)	16.6	50	No
105-E (Office)	106.1	50	Yes
104-E (Office)	16.4	50	No
104-1-B (Office)	90.8	50	Yes
102-E (Office)	35.4	50	No
Drill Hall	11.8	30	No
D-9T-S (Men's Restroom)	43.5	5	Yes
D-12-T-S (Women's Restroom)	63.4	5	Yes
Gate 6 Area (Foyer)	16.4	10	Yes
108-S (Hallway)	31.7	5	Yes
32-5-S (Office)	64.8	50	Yes
32-S (Conference Room)	33.2	30	Yes
35-5-S (Office)	4.8	50	No
105-S (Office)	81.6	50	Yes
101-T-S (Women's Restroom)	107.5	5	Yes
110-T-S (Men's Restroom)	32.0	5	Yes
17-D-S (Office)	174.7	50	Yes
17-C-S (Office)	78.8	50	Yes
17-5-S (Office)	46.7	50	No
15-6-S (Office)	67.7	50	Yes
15-6-A (Conference Room)	41.8	30	Yes
15-5-S (Locker Room)	44.1	7	Yes
15-T-S (Restroom)	37.9	5	Yes
118-W (Lobby)	17.7	10	Yes
118-6 (Locker Room)	32.1	7	Yes
117-W (Office)	7.3	50	No
117-1-W (Office)	91.9	50	Yes
117-6-W (Office)	16.2	50	No
116-W (Office)	18.8	50	No
116-6 (Office)	42.7	50	No
116-C (Office)	31.1	50	No
116-5 (Conference Room)	59.4	30	Yes
113-W (Office)	42.1	50	No
112-W (Lobby)	54.8	10	Yes
1st Floor West Side Lobby	18.1	10	Yes
109-W (Office)	31.3	50	No
107-T-W (Unisex Restroom)	89.5	5	Yes
106-1A-W (Office)	81.2	50	Yes
106-W (Lobby)	76.2	10	Yes
106-6-W (Office)	31.3	50	No

Army National Guard – Washington D.C. Armory *Lighting Measurements*			
Location	*Measurement in Foot Candles*	*Requirement in Foot Candles*	*Requirement Met?*
106-5C-W (Office)	114.3	50	Yes
106-5A-W (Daycare Classroom)	32.4	30	Yes
105-W (Lobby)	28.2	10	Yes
105-4A-W (Office)	141.6	50	Yes
105-A-W (Office)	35.3	50	No
105-5 (Classroom)	34.6	30	Yes
104-W	Inaccessible		
118-D-N (Office)	27.2	50	No
118-C-N (Office)	38.4	50	No
118-A-N (Office)	23.9	50	No
116-N (Office)	15.2	50	No
C-15-N (North Lobby)	16.9	10	Yes
C-16-N (Elevator Lobby)	13.3	10	Yes
106-A-N (Museum)	8.1	30	No
105-B-N (Office)	31.9	50	No
107-A-N (Office)	25.8	50	No
109-T-N (Men's Restroom)	33.2	5	Yes
110-N (Women's Restroom)	Inaccessible		
117-5-A (Office)	42.6	50	No
116-B (Office)	106.7	50	Yes
116-1-E (Office)	84.8	50	Yes
209-E (Office)	41.3	50	No
208-1-E (Office)	40.9	50	No
208-E (Office)	54.7	50	Yes
205-E (Office)	72.6	50	Yes
201-E (Office)	57.9	50	Yes
202-E (Copy Room)	39.3	10	Yes
106-6-E (Office)	82.3	50	Yes
106-6-A-E (Conference Room)	158.1	30	Yes
106-5-E (Office)	77.9	50	Yes
213-T-S (Unisex Restroom)	25.6	5	Yes
212-S (Lobby)	30.1	10	Yes
212-4 (Office)	136.4	50	Yes
212-6 (Office)	32.6	50	No
212-5 (Classroom)	24.3	30	No
211-S (Classroom)	58.8	30	Yes
209-S (Classroom)	44.6	30	Yes
204-4A-S (Conference Room)	27.4	30	No
204-S (Locker Room)	85.8	7	Yes
204-S (Office)	58.2	50	Yes
203-T-S (Women's Restroom)	28.1	5	Yes
202-S (Lobby)	20.3	10	Yes
202-1C-S (Office)	66.3	50	Yes
202-6-S (Locker Room)	16.4	7	Yes
202-5 (Locker Room)	18.6	7	Yes
202-5 (Restroom)	25.3	5	Yes
209-W (Office)	11.9	50	No

Army National Guard – Washington D.C. Armory *Lighting Measurements*			
Location	*Measurement in Foot Candles*	*Requirement in Foot Candles*	*Requirement Met?*
116-5-A (Conference Room)	23.6	30	No
116-6-W (Office)	26.8	50	No
208-W (Office)	45.7	50	No
206-W (Office)	95.6	50	Yes
204-W (Office)	114.8	50	Yes
202-W (Women's Restroom)	29.4	5	Yes
201-W (Office)	87.4	50	Yes
306-T-W (Women's Restroom)	14.8	5	Yes
307-T-W (Men's Restroom)	11.3	5	Yes
302-W (Classroom)	38.9	30	Yes
301-W (Office)	106.1	50	Yes
2nd Floor NW Section, Women's Restroom	11.3	5	Yes
J1H219 (Office)	50.4	50	Yes
J1H210 (Office)	38.1	50	No
Reception Area	19.7	10	Yes
216-A-N (Office)	61.8	50	Yes
214-N (Office)	82.7	50	Yes
213-N (Office)	40.3	50	No
212-T-N (Men's Restroom)	72.0	5	Yes
217-1-N (Office)	65.4	50	Yes
118-1 (Unisex Restroom)	23.3	5	Yes
118-6-N (Hallway)	49.1	5	Yes
212-1 (Office)	21.9	50	No
117-5-A (Office)	27.6	50	No
304-E (Conference Room)	38.3	30	Yes
305-E (Computer Lab)	160.1	30	Yes
303-E (Classroom)	46.6	30	Yes
301-E (Office)	39.9	50	No
3rd Floor North Wing	Inaccessible		
401-N (Storage)	19.6	30	No
404-N (Office)	41.6	50	No
405-N (Office)	95.2	50	Yes
406-N (Office)	102.4	50	Yes
408-N (Office)	46.3	50	No
409-N (Storage)	28.7	30	No

Lighting levels were compared to the levels outlined within the American National Standards Institute/Illuminating Engineering Society of North America (ANSI/IESNA) RP-1-04 Office Lighting Handbook, and the ANSI/IESNA 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 & LIMITATIONS

Bonus Environmental, LLC was contracted by the National Guard Bureau Region North Industrial Hygiene office to identify and measure the existence and extent of potentially hazardous operations or conditions at the Washington D.C. Armory facility located at 2001 E. Capital Street in Washington D.C., 20003. 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 conditions were evaluated during this industrial hygiene evaluation performed by Bonus Environmental, LLC representatives Non-Responsive and Non-Responsive on September 24, 2012.

The results/findings of this industrial hygiene evaluation are summarized below.

1. Lead wipe sample results collected within the Washington D.C. Armory were above the OSHA interpretive level of 200 µg/ft², as well as the 200 µg/ft² threshold established in NG Pam 420-15.

2. Bonus Environmental, LLC identified several areas of peeling paint which contained detectable levels of lead, potentially posing a lead exposure hazard.

3. Bonus Environmental, LLC did not identify any PACM that was considered to be in poor or damaged condition.

4. Bonus Environmental, LLC identified approximately 60 ft² of moldy drywall in Room 119 (Maintenance Room).

5. Bonus Environmental, LLC identified approximately 8 ft² of stained drop ceiling tile from three locations in the Washington D.C. Armory.

6. Bonus Environmental, LLC found the housekeeping practices within Washington D.C. Armory in good order.

7. Following the interviews and observations, no ergonomic and or indoor air quality concerns were identified.

8. Bonus Environmental, LLC measured temperature, relative humidity, CO, and CO_2 throughout the Washington D.C. Armory. All were found to be below or within their acceptable ranges/limits.

9. Areas within the Washington D.C. Armory facility were identified as improperly illuminated.

Bonus Environmental, LLC has provided these services consistent with the level and skill ordinarily exercised by members of the profession currently providing similar services under similar circumstances at the time the services were provided. This statement is in lieu of other statements either expressed or implied. This report is intended for the sole use of National Guard Region North - Industrial Hygiene Office. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document, the findings, conclusions, or recommendations is at the risk of said user.

As with all such surveys, the results of the sampling represent conditions found on the date of the survey and may not represent conditions found at other times. Additionally, this survey was limited with respect to the specific parameters indicated above and should not be construed to be a comprehensive evaluation or a definitive representation of conditions within the facility. The information presented in this report is intended to be used as a guide to evaluate the need for further investigation or the need for modifications to the processes or procedures surveyed.
The Client recognizes and agrees that all testing and remediation methods have reliability limitations, no method nor number of sampling locations can guarantee that a condition will be discovered within the performance of the services as authorized by the Client. Additionally, the passage of time may result in a change in the environmental characteristics at this site. This report does not warrant against future operations or conditions that could affect the recommendations made. The results, findings, conclusions, and recommendations expressed in this report are based only on conditions that were observed during Bonus Environmental, LLC's inspection of the site.

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,

Non-Responsive

Principal
Bonus Environmental, LLC

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Appendix A

Lead Sampling Results

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

AIHA LAP, LLC ACCREDITED LABORATORY
INDUSTRIAL HYGIENE, ENVIRONMENTAL LEAD & ENVIRONMENTAL MICROBIOLOGY
ISO/IEC 17025:2005
www.aihaaccreditedlabs.org
LAB #100470

Client:	National Guard Bureau	**Job Name:**	DC Armory	**Chain Of Custody:**	514013
Address:	301-IH Old Bay Lane, Attn: ARNG-CJG-P, State Military Reservation	**Job Location:**	Washington, DC	**Date Submitted:**	9/27/2012
	Havre de Grace, Maryland 21078	**Job Number:**	Not Provided	**Person Submitting:**	Non-Responsive
		P.O. Number:	W912K6-09-A-0003	**Date Analyzed:**	9/28/2012 **Report Date:** 10/1/2012

Attention: Non-Responsive

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		Total ug	Final Result		Comments
12096038	DCA-LW-18	Flame	Wipe	****	0.111	110	ug/ft²	28	260	ug/ft²	
12096039	DCA-LW-19	Flame	Wipe	****	0.111	110	ug/ft²	380	3400	ug/ft²	
12096040	DCA-LW-20	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)-7000B; Water: SM-3111B

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

See QC Summary for analytical results of quality control samples associated with these samples.

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.

Non-Responsive

Technical Manager: Non-Responsive

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Attention: Non-Responsive

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		Total ug	Final Result		Comments
12096019	DCA-PC-1	Flame	Paint Chip	****	N/A	0.0072	%Pb		0.084	%Pb	
12096020	DCA-PC-2	Flame	Paint Chip	****	N/A	0.0099	%Pb		0.052	%Pb	
12096021	DCA-LW-1	Flame	Wipe Blank	****	N/A	12	ug		<12	ug	
12096022	DCA-LW-2	Flame	Wipe	****	0.111	110	ug/ft²	27	240	ug/ft²	
12096023	DCA-LW-3	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096024	DCA-LW-4	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096025	DCA-LW-5	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096026	DCA-LW-6	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096027	DCA-LW-7	Flame	Wipe	****	0.111	110	ug/ft²	26	240	ug/ft²	
12096028	DCA-LW-8	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096029	DCA-LW-9	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096030	DCA-LW-10	Flame	Wipe	****	0.111	110	ug/ft²	14	120	ug/ft²	
12096031	DCA-LW-11	Flame	Wipe	****	0.111	110	ug/ft²	4500	40000	ug/ft²	
12096032	DCA-LW-12	Flame	Wipe	****	0.111	110	ug/ft²	55000	490000	ug/ft²	
12096033	DCA-LW-13	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096034	DCA-LW-14	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096035	DCA-LW-15	Flame	Wipe	****	0.111	110	ug/ft²	76	690	ug/ft²	
12096036	DCA-LW-16	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	
12096037	DCA-LW-17	Flame	Wipe	****	0.111	110	ug/ft²	<12	<110	ug/ft²	

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CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) 514013

Mailing/Billing Information:

1. Client Name: National Guard Bureau
2. Address 1: 301-IH Old Bay Lane
3. Address 2: Attn: NGB-AVN-SI, State Military Reservation
4. Address 3: Havre de Grace, Maryland 21078
5. Phone #: (410) 942-0273 Fax #: (410) 942-0254

Submittal Information:

1. Job Name: DC Armory
2. Job Location: Washington, DC
3. Job #: _____ P.O. #: W912K6-09-A-0003
4. Contact Person: Non-Responsive
5. Submitted by: _____

Reporting Info (Results provided as soon as technically feasible). If no TAT/Reporting Info is provided, AMA will assign defaults of 5-Day and email/fax to contacts on file.

AFTER HOURS (must be pre-scheduled)	NORMAL BUSINESS HOURS	REPORT TO:
☐ Immediate Date Due: _____	☐ Immediate ☐ 3 Day ☐ Results Required By Noon	☒ Include COC/Field Data Sheets with Report
☐ 24 Hours Time Due: _____	☐ Next Day ☒ 5 Day +	☒ Em Non-Responsive bonuserwironmental.com
Comments: _____	☐ 2 Day Date Due: _____	☐ Fax [redacted] us.army.mil
		☐ Ver [redacted] us.army.mil

Asbestos Analysis

*PCM Air – Please Indicate Filter Type:
☐ NIOSH 7400 _____ (QTY)
☐ Fiberglass _____ (QTY)

TEM Air* – Please Indicate Filter Type:
☐ AHERA _____ (QTY)
☐ NIOSH 7402 _____ (QTY)
☐ Other (specify _____) _____ (QTY)

PLM Bulk
☐ EPA 600 – Visual Estimate _____ (QTY)
☐ EPA Point Count _____ (QTY)
☐ NY State Friable 198.1 _____ (QTY)
☐ Grav. Reduction ELAP 198.6 _____ (QTY)
☐ Other (specify _____) _____ (QTY)

MISC
☐ Vermiculite
☐ Asbestos Soil PLM_(Qual) PLM_(Quan) PLM/TEM_(Qual) PLM/TEM_(Quan)

*It is recommended that blank samples be submitted with all air and surface samples

TEM Bulk
☐ ELAP 198.4/Chatfield _____ (QTY)
☐ NY State PLM/TEM _____ (QTY)
☐ Residual Ash _____ (QTY)

TEM Dust*
☐ Qual. (pres/abs) Vacuum/Dust _____ (QTY)
☐ Quan. (s/area) Vacuum D5755-95 _____ (QTY)
☐ Quan. (s/area)Dust D6480-99 _____ (QTY)

TEM Water
☐ Qual. (pres/abs) _____ (QTY)
☐ ELAP 198.2/EPA 100.2 _____ (QTY)
☐ EPA 100.1 _____ (QTY)

☒ All samples received in good condition unless otherwise noted.
TEM Water samples _____ °C)

If field data sheets are submitted, there is no need to complete bottom section.

Metals Analysis
☒ Pb Paint Chip 2 (QTY)
☒ *Pb Dust Wipe (wipe type Ghost) 20 (QTY)
☐ *Pb Air _____ (QTY)
☐ Pb Soil/Solid _____ (QTY)
☐ Pb TCLP _____ (QTY)
☐ Drinking Water ☐ Pb _____ (QTY) ☐ Cu _____ (QTY) ☐ As _____ (QTY)
☐ Waste Water ☐ Pb _____ (QTY) ☐ Cu _____ (QTY) ☐ As _____ (QTY)
☐ Pb Furnace (Media _____) _____ (QTY)

Fungal Analysis
Collection Apparatus for Spore Traps/Air Samples: _____
Collection Media _____
☐ *Spore-Trap _____ (QTY) ☐ Surface Vacuum Dust _____ (QTY)
☐ *Surface Swab _____ (QTY) ☐ Culturable ID Genus (Media _____) _____ (QTY)
☐ *Surface Tape _____ (QTY) ☐ Culturable ID Species (Media _____) _____ (QTY)
☐ Other (Specify _____) _____ (QTY)

CLIENT ID #	SAMPLE INFORMATION / SAMPLE LOCATION/ID	DATE/ TIME	VOL (L) / Wipe Area	ANALYSIS: TEM	PCM	PLM	LEAD	MOLD	AIR	BULK	DUST	MATRIX: WATER (DRINKING)	WATER (WASTE)	SPORE TRAP	TAPE	SWAB
DCA-PC-1	Blue Paint	9-24-12					*			*						
DCA-PC-2	White Paint						*			*						
DCA-CW-1	SEE ATTACHED FIELD DATA SHEETS						*				*					

CLIENT CONTACT (LABORATORY STAFF ONLY)

Date/Time:	Contact:	By:
Date/Time:	Contact:	By:
Date/Time:	Contact:	By:

Non-Responsive [redacted]

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time RCVD: 9/27/12 @ 1130 Via: FedEx By (Print): _____ Sign: _____
2. Date/Time Analyzed: ___/___/___ @ ___ By (Print): _____ Sign: _____
3. Results Reported To: _____ Via: _____ Date: ___/___/___ Time: _____ Initials: _____
4. Comments: 9799 9085 9698

1 of 2

Surface Sampling Field Data Sheet

Date Collected: 9-24-12
Job Number: 1061-14
Contact Person: Non-Responsive
Job Name: DC Armory
Job Location: Washington, DC
Address: 2001 E. Capitol St. Washington, DC
Company: Bonus Environmental, LLC
Phone Number: 989-621-3862
Collected By: Non-Responsive
COC Number:

Sample Number	Sample Location	Surface/Substrate Sampled	Area Wiped (in^2/ft^2)	Collection Media
DCA-LW-1	Field Blank		—	Ghost wipes
DCA-LW-2	Rm 108 E	window sill	4" x 4"	
DCA-LW-3	basement level, NW section hallway outside of clinic	top of blood pressure machine		
DCA-LW-4	Rm 12-G	top of Fan blade		
DCA-LW-5	Drill Hall	on floor, center-east		
DCA-LW-6		on floor, center-west		
DCA-LW-7		SW section, on portable basketball hoop		
DCA-LW-8		NW section, top of cash register		
DCA-LW-9		NE section, on seat in red section		
DCA-LW-10	outside of Rm D-IT-N	top of Pay phone		
DCA-LW-11	Former Indoor Firing Range	on floor, east end		
DCA-LW-12		on floor, bullet trap area		
DCA-LW-13	Hallway Across from Rm 117-1B-E	top of fire extinguisher Cabinet		

Please Return Samples To:
AMA Analytical Services, Inc., 4475 Forbes Blvd., Lanham, MD 20706, (800) 346-0961/(301) 459-2640 Fax, www.amalab.com, info@amalab.com

2 of 2

Surface Sampling Field Data Sheet

Date Collected: 9-24-12
Job Number: 1061-14
Contact Pers: Non-Responsive
Job Name: DC Armory
Job Location: Washington, DC
Address: 2001 E. Capitol St. Washington, DC
Company: Provi Environmental, LLC
Phone Number: 781-631-3862
Collected E: Non-Responsive
COC Number:

Sample Number	Sample Location	Surface/Substrate Sampled	Area Wiped (in^2/ft^2)	Collection Media
DCA-LW-14	Rm 110-6-A (NE Section)	top of file cabinet	4" x 4"	Ghost wipes
DCA-LW-15	Near Rm 203-N	top of coin coke machine		
DCA-LW-16	4th Floor Hallway, near Rm 404-N	top of water fountain		
DCA-LW-17	2nd Floor, west side hallway near 205-W	top of defibrillator case		
DCA-LW-18	Rm 307-W	NW window sill		
DCA-LW-19	Rm 211-S	SW window sill		
DCA-LW-20	Hallway outside of 109-S	top of brochure's table		

Please Return Samples To:
AMA Analytical Services, Inc., 4475 Forbes Blvd., Lanham, MD 20706, (800) 346-0961/(301) 459-2640 Fax, www.amalab.com, info@amalab.com

Appendix B

Photographs

Boiler Room

Boiler Room, peeling white paint

Room 12-W (“Microbial Hazard”), wall studs following drywall removal

Room 12-W (“Microbial Hazard”), stained carpet

Former Indoor Firing Range

Room 119, fungal growth on walls

Room D-9T-S (men's restroom), peeling blue paint

Building Exterior, north entrance

Room 17-C-S, stained dropped ceiling tile

Building exterior, looking southeast

Drill floor, looking west

Appendix C

References

1. Department of Defense Instruction (0001) 6055.1, Department of Defense Occupational Safety and Health (OS H) Program, August 19, 1998.

2. Army Regulation (AR) 11-34, The Army Respiratory Protection Program, February 15, 1990.

3. DA PAM 40-503, Medical Service, Industrial Hygiene Program, October 30, 2000.

4. Technical Manual (T.M) 5-810-1, Mechanical Design, Heating, Ventilation, and Air Conditioning, June 1991.

5. Threshold Limit Values (TLVs) and Biological Exposure Indices (BEls), American Conference of Governmental Industrial Hygienists (ACGIH), current edition.

6. UFC 3-410-01 FA Heating, Ventilating, and Air Conditioning, 15 May 2003, change 4 January 2010

7. Occupational Safety and Health Administration (OSHA) Lead in Construction Standard, 29 CFR 1926.62.

8. Army Regulation (AR) 385-10, The Army Safety Program, August 23, 2007/RAR 14 June 2010.

9. RP-1-2004, Office Lighting, Illuminating Engineering Society of North America / American National Standards Institute (IESNA/ANSI).

10. RP-7-2001, Industrial Lighting, (IESNA/ANSI).

11. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Standard 62.1-2010, "Ventilation for Acceptable Indoor Air Quality".

12. ASHRAE Standard 55-2010 – “Thermal Environmental Conditions for Human Occupancy”

13. Title 24, CFR, Part 35, Subpart B, Sections 35.110, Definitions of Lead-Based Paint, Housing and Urban Development, U.S. Department of Housing.

14. OSHA Permissible Exposure Limit (PEL) for General Industry 29 CFR 1910.1000 Z-1 Table

15. Guidelines on Assessment and Remediation of Fungi in Indoor Environments, New York City Department of Health and Mental Hygiene, November 2008.

16. Mold Remediation in Schools and Commercial Buildings, U.S. Environmental Protection Agency, March 2001

17. Army Facilities Management Information Document on Mold Remediation Issues TG277, February 2002

18. NG PAM 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

lea environmental, llc

Industrial Hygiene Investigation
District of Columbia Armory
Readiness Center
Washington, D.C.

PURCHASE REQUEST NUMBER: 0010491631
CIN: GFEBS001049163100003

Prepared for:
NGB ARNG Region North IH Office
USPFO for Maryland-W912K6
301 Old Bay Lane
Havre de Grace, MD

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October 2014

Table of Contents

SECTION 1.0 PROJECT OVERVIEW & SUMMARY

On June 30, 2014, an Industrial Hygiene Investigation was conducted at the DC Armory Readiness Center (RC). Mr. Non-Responsive of LEA Environmental LLC (LEA) conducted the investigation. The site contacts for the survey were Safety and Occupational Health Specialists, CIV, DCARNG Non-Responsive and SPC, DCARNG Non-Responsive. LEA was contracted to perform an evaluation of the subject facility following standard guidelines and protocols as well as to identify any immediate concerns to environmental health & safety. The evaluation included the following activities:

- A general overview of the activities performed during the workday was conducted, including interviews with site representatives for background information.
- An evaluation of the ventilation system was conducted.
- Direct reading instrumentation was utilized to measure common indoor air quality parameters including temperature, relative humidity, carbon dioxide and carbon monoxide.
- A lighting evaluation was conducted in the warehouse and the adjacent office spaces.
- An on-site review of the site-specific written compliance programs was conducted.
- A building survey was conducted for identification of potential hazardous building materials (mainly potential peeling lead-based paint and potential asbestos containing materials) was conducted. Samples were collected and sent to an appropriately accredited laboratory for analysis.
- Sampling for lead was conducted using ghost wipes for the potential cross contamination of lead. Samples were collected and sent to an appropriately accredited laboratory for analysis.
- Air sampling was conducted to determine the presence of lead in the air. Samples were collected and sent to an appropriately accredited laboratory for analysis.
- An evaluation of the personal protective equipment utilized by workers during the course of the work activities was conducted.
- Photographic documentation was collected in the facility.

It should be noted that based on interviews with the site point of contact, not all rooms were accessible and there was no access to the 3rd Floor North (Generals' Floor).

During the course of the investigation, an area of water intrusion was noted in room 105-A. Water damage on ceiling tiles and radiator pipe wrap was observed. A sample (P-2) was collected of the pipe wrap and analyzed for the

presence of Asbestos Containing Materials (ACM). Results of the sample analysis indicated no ACM detected.

In addition, peeling paint was observed at the basement level of stairwell 11-L1, which appeared to be the direct result of a previous water intrusion event that occurred in the basement floor of the facility. Peeling paint was also observed in room 303E, currently being renovated. Samples P-1 and P-3 were collected and analyzed for lead. Results indicated lead levels below the recommended limit for classification as "Lead Based Paint".

At the time of the investigation the POC of the DC Armory indicated an air quality complaint in a small closet housing gas masks and field bags (Room 105-2). An investigation of the area was conducted and observations and direct reading instrumentation did not indicate an immediate concern to environmental health and safety.

In addition, the POC indicated a mold complaint was noted in a double shower (Room 5-SB) and a women's restroom (Room 10-SB). Room 5-SB was previously cleaned and no visible mold growth was observed. Visible mold growth was observed in Room 10-SB on the ceiling tile where visible watermarks were also observed.

The lighting survey was conducted throughout the facility offices. The results of the survey revealed that several areas demonstrated illumination levels that were below the recommended minimums. It should be noted that based on the size and access of the facility, all rooms could not be investigated. In addition, there was no access to the 3rd floor north corridor.

The on-site review of written compliance programs found the programs supplied complete, with attached documentation of employee training.

During the survey, inspection dates on portable fire extinguishers were checked and were found to be current.

Based on the operations of the facility, a chemical inventory and Material Safety Data Sheets were not noted during the course of the survey.

SECTION 2.0 INTRODUCTION

On June 30, 2014, an Industrial Hygiene Investigation was conducted at the DC Armory Readiness Center, as part of contractual monitoring program.

The parameters of the survey were determined through the contractual requests, evaluation of the subject facility, collection of background information from the site Point of Contact, as well as through industrial hygiene experience and laboratory consultation.

Section 2.1 Parameters & Methodology

The parameters selected for the purposes of this survey included various elements of environmental health & safety and Industrial Hygiene. The following information outlines some of the methodologies for the equipment utilized and sampling conducted during the course of the investigation.

- Temperature: Temperature in the subject space was measured utilizing a direct-reading Q-Trak 7565-X Indoor Air Quality Meter. The range of the monitor is from 32 to 140˚F, with increments of 0.1˚.
- Relative Humidity: Relative humidity levels in the subject space were measured utilizing a direct-reading Q-Trak 7565-X Indoor Air Quality monitor. The range of the monitor is from 5 to 95% RH, with increments of 0.1%.
- Carbon Dioxide: Carbon dioxide levels in the subject space were measured utilizing a direct-reading Q-Trak 7565-X Indoor Air Quality monitor. The range of the monitor is from 0 to 5,000 parts per million (ppm), with increments of 1 ppm.
- Carbon Monoxide: Carbon monoxide levels in the subject space were measured utilizing a direct-reading Q-Trak 7565-X Indoor Air Quality monitor. The range of the monitor is from 0 to 500 ppm, with increments of 0.1 ppm.
- Air Velocity: Velocity levels in the subject space were measured utilizing a direct-reading VelociCalc Meter, Model 5725. The range of the meter is 50 to 6,000 feet per minute (ft/min.).
- Light: Levels were measured in the subject's space utilizing a direct-reading cal-Light 400 light meter. The range of the meter is 0.1 foot-candles (fc) to 40,000 fc.
- Lead Dust: Lead dust samples were collected from the facility following guidelines established by Housing and Urban Development (HUD). Samples were collected utilizing Ghost Wipes and sent to an appropriately accredited laboratory for sample analysis via Flame AAS.
- Lead in Air: Lead air samples were collected from the facility following guidelines established by the Occupational Safety and Health

Administration (OSHA). Samples were collected utilizing an air pump and SKC charcoal sample tube and sent to an appropriately accredited laboratory for sample analysis via Flame AAS.

- Lead Paint: Paint chip samples were collected from the facility following guidelines established by the Environmental Protection Agency (EPA). Samples were collected and sent to an appropriately accredited laboratory for sample analysis via Flame AAS.
- During the investigation, a bulk sample was collected of a material identified as suspected to contain asbestos. The bulk sample was collected following guidelines established by Asbestos Hazard Emergency Response Act (AHERA). The sample was collected and sent to an appropriately accredited laboratory for analysis utilizing Polarized Light Microscopy (PLM) method.

Section 2.2 Site-Specific Survey Locations

The following locations include the site-specific points where measurements were collected, as well as air sampling, ghost wipes, lead paint sampling and asbestos containing materials (ACM) sampling. The locations are described with information provided during the survey by the Point of Contact and site representatives.

- Room 107-E (direct reading instrumentation including Indoor Air Quality (IAQ) and light meters)
- Headquarters District Area Command Room 105-A (direct reading instrumentation including IAQ, smoke tubes and ACM sampling)
- Headquarters District Area Command Room 105-1 (direct reading instrumentation including IAQ)
- Room 303-E (direct reading instrumentation including IAQ, light meters, and lead paint sampling)
- Second Floor North Hall (direct reading instrumentation including IAQ and light meters)
- Drill Hall (direct reading instrumentation including IAQ, light meters, smoke tubes, air sampling and ghost wipe sampling)
- First Floor East Hall (direct reading instrumentation including IAQ, light meter and smoke tubes)
- Outside comparison samples collected near entrance to bays (direct reading IAQ meter)

SECTION 3.0 PROJECT DISCUSSION

Upon completion of the survey, and receipt of sample results, the information obtained is researched and compared against applicable standards. Any observations made by the Industrial Hygienist during the course of the survey are added to the interpretation to understand any possible abnormalities. The following outlines the results for the individual parameters selected for monitoring, and information on the applicable regulations and/or guidelines researched.

Section 3.1 Temperature & Relative Humidity

Levels of temperature and relative humidity measured during the course of the investigation were compared to the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) published guidelines. The guidelines prepared by ASHRAE are represented in the following chart:

Relative Humidity	Winter Temperature Range	Summer Temperature Range
30%	68.5 - 76.0 F	74.0 – 80.0 F
40%	68.5 - 75.5 F	73.5 – 79.5 F
50%	68.5 - 74.5 F	73.0 – 79.0 F
60%	68.0 - 74.0 F	72.5 – 78.0 F

Based on studies conducted by ASHRAE, the published standard reflects the levels where 80% of building occupants are comfortable.

The temperature levels in the AASF facility ranged from 75.3˚F to 83.8˚F, and slightly above the range as described by ASHRAE. The relative humidity levels ranged from 46.0% to 65.2% in the subject space. Relative humidity levels were also slightly above recommended levels in some areas. A complete charting of the measurements is included in Section 4.1.

Section 3.2 Carbon Dioxide

Levels of carbon dioxide in an office space are often measured in order to determine the efficiency of ventilation systems in the building. Elevated levels of carbon dioxide can often indicate inadequate ventilation based on the number of occupants in a space. ASHRAE has outlined ventilation

requirements for office spaces, as well as provided guidelines for limits of carbon dioxide in a space. A conservative guideline provided by ASHRAE is that carbon dioxide levels remain below 1,000 ppm. In addition, as outdoor levels of carbon dioxide often directly impact indoor levels, ASHRAE also recommends a secondary guideline of indoor levels remaining below outdoor levels plus 700 ppm. In addition to ventilation indicators, excessive carbon dioxide levels can also exhibit adverse conditions in occupants such as headaches and lethargy. As the facility in question was noted to have limitations of the ventilations systems present, these measurements could be utilized to determine an immediate need for increased ventilation, if applicable.

The carbon dioxide levels measured in the subject spaces of the AASF facility ranged from 488 ppm to 895 ppm. These levels were below the more conservative ASHRAE recommendation. A complete charting of the measurements is included in Section 4.1.

Section 3.3 Carbon Monoxide

Carbon monoxide is a common indoor air quality contaminant, resulting from incomplete fuel combustion in furnaces and generators, as well as through automobile exhaust and tobacco smoke. Levels of carbon monoxide in an interior working environment can also indicate improper idling of vehicles, such as trucks, near the facility or in the maintenance bays during normal work operations.

Carbon monoxide is a colorless and odorless gas that causes the formation of carboxyhemoglobin in the blood stream. At moderate levels, this can cause angina, impaired vision and reduced brain function. In indoor spaces, various agencies have established indoor limits for carbon monoxide. However, a commonly referenced standard is the National Ambient Air Quality Standard (NAAQS) of 9 ppm for an eight-hour exposure limit. The levels of carbon monoxide ranged from 0.1 ppm to 1.3 ppm in the subject space, and below the recommended limit. A complete charting of the measurements is included in Section 4.1.

Section 3.4 Ventilation Survey

At the time of the inspection the majority of the facility did not have a centralized HVAC unit, but utilized individual window air-cooling units. Heat for the facility was supplied via oil/boiler. Overhead exhaust and ceiling fans were observed in the drill hall. A portion of the second floor that has recently been renovated utilizes a central HVAC system. According to the POC and several employees at the facility ventilation and air circulation is an ongoing problem and complaint at the facility.

In addition to the collection of direct reading measurements in the subject space, smoke tubes were utilized to document the direction of airflow in the facility. The smoke tube testing revealed that most of the areas in the facility revealed a "neutral" response, with limited directionality or movement from the point of origin.

Section 3.5 Lighting Survey

A lighting survey was conducted in the office areas and the drill hall. Due to the size and number of rooms in the facility all of the rooms could not be surveyed. The measurements were documented in footcandles (fc), and were compared against the recommended guidelines in both the ANSI guidelines for Office Lighting and Industrial Lighting. The results of the survey revealed that lighting levels ranged from 4.5 fc (Drill Hall North) to 122.9 fc (Room 107E). Illumination levels throughout the facility should be addressed to remain above recommended minimums. A complete listing of the sample results is included in Section 4.3.

Section 3.6 Surface Lead Sampling

Samples were collected for the potential presence of lead on surfaces. The surface samples were collected utilizing SKC Ghost Wipes. The surface samples were collected in and adjacent to the former indoor firing range and areas located within the drill hall as well as offices throughout the facility where a potential cross contamination may be of concern.

Results of the sampling revealed levels of lead on surfaces above the Housing and Urban Development (HUD) regulatory limits in samples G-2 (Pistol Range Floor), G-7 (Drill Hall Brick Wall), G-8 (Drill Hall Exhaust Vent), G-9 (Drill Hall Return Vent), and G-10 (Room 107E Window Sill). A summary of the results is included in Section 4.4

Section 3.7 Potential Hazardous Building Materials Survey

During the course of the evaluation, a visual inspection was conducted to determine the potential presence of hazardous building materials, such as asbestos or lead containing materials. In addition, the visual inspection includes identification of potential avenues of water intrusion that may lead to the amplification of microbial growth.

During the course of the evaluation, peeling paint was observed in stairwell 11 L-1 and on the ceiling of room 303E currently being renovated. Paint chip samples were collected for lead analysis. The results of the samples indicated

lead levels below the regulatory limit. A summary of the results is included in Section 4.5.

A mold complaint was noted by the POC in a double shower (Room 5-SB) and a women's restroom (Room 10-SB). Room 5-SB was previously cleaned and no visible mold growth was observed. Visible mold growth was observed in Room 10-SB on the ceiling tile where visible watermarks were also observed.

At the time of the investigation the POC indicated an air quality (odor) complaint from an employee working adjacent to Room 105-2, a small closet that houses gas masks and field bags. An investigation of the area was conducted and observations and direct reading instrumentation within the small closet did not indicated an immediate concern to environmental health and safety.

During the investigation, a sample was collected of a material identified as suspected to contain asbestos. The sample (P-2) collected was pipe insulation located in Room 105A that was damaged following a water intrusion event. The bulk sample was collected following guidelines established by AHERA. The sample was collected and sent to an appropriately accredited laboratory for analysis. Results of the sample indicated no asbestos containing material detected. A summary of the results is included in Section 4.6.

Section 3.8 Lead in Air Sampling

During the course of the evaluation, air samples were collected on a PVC filtered cassette, and analyzed at an appropriately accredited laboratory for lead via EPA 600.

Samples were collected in the former firing range and drill hall as recommended in the ARNG Scope of Work. Results of the samples indicated levels of lead were below the OSHA Regulatory limit of 0.05 mg/m^3. A summary of the results is included in Section 4.7.

Section 3.8 Written Compliance Program Evaluations/Chemical Inventories

During the course of the survey, an on-site review of documentation provided by the site contact occurred, to include site-specific written compliance programs. The following written compliance programs were found in the documentation:

- Hazard Communication Training
- Fire Protection Training
- Hearing Conservation Program

The programs were found to have been complete and subsequent training documentation was attached to verify the worker's completion of the training. In addition, interviews with the site representatives confirmed that related safety training is completed in house on a quarterly schedule. The records found confirmed this statement.

The facility did not have a Respiratory Protection Program or Confined Space Entry Program. When discussed with the site POC, it was reported that the facility does not require these programs.

Section 3.9 General Observations & Work Activities

The DC Armory Readiness Center consists of one large three-story building and one sub-floor (basement). Construction of the facility was reportedly completed in 1941. The facility consists mainly of department and support staff offices, ancillary storage rooms and corridors, and a 10,000-seat drill hall.

The armory is utilized Monday thru Friday by full time Guard personnel. The facility supports and maintains ongoing DCARNG missions as well preparing units for drill weekends, occurring two weekends out of the month. The drill hall is utilized by the DCARNG and the DC Area for various events. There is usually an event held at least once a month on the drill floor, however, it may not necessarily be a Guard sponsored event. The drill floor, when used by DCARNG, can host small events such as troop deployment ceremonies, promotion ceremonies, and retirement ceremonies. The drill floor is also used for unit events in which all full time personnel are required to attend and the entire floor is used, as well as for memorial services for deceased soldiers.

On the day of the survey, there was approximately 300 staff at the facility. A diagram of the facility as provided by the POC is included in Appendix A.

SECTION 4.0 DETAILED RESULTS

Section 4.1 Direct-Reading Instrumentation Results

Location	*Temp. (˚F)*	*Relative Humidity (%)*	*Carbon Dioxide (ppm)*	*Carbon Monoxide (ppm)*
Recommended & Regulatory Limits	*68.5°F – 74.0 °F (ASHRAE)*	*30.0% - <65.0% (ASHRAE)*	*1,000 ppm (ASHRAE)*	*9 ppm (NAAQS)*
Room 107E	**75.3**	50.3	895	0.9
Room 303E	**79.7**	**65.2**	488	1.3
Room 105-A	**78.0**	50.0	590	0.8
Room 105-1	**77.8**	58.4	505	0.9
First Floor East Hall	**76.6**	61.5	516	0.2
2nd Floor North Hall	**76.5**	**63.8**	543	0.1
JI-H Hall	**76.8**	57.2	744	0.2
4th Floor Hall	**78.3**	46.0	790	0.1

˚F: degrees Fahrenheit
ppm: parts per million
Reference: ASHRAE 55-2013

Section 4.2 Outside Readings

Temperature (˚F)	*Relative Humidity (%)*	*Carbon Dioxide (ppm)*	*Carbon Monoxide (ppm)*
94.3	65.7	400	0.0

˚F: degrees Fahrenheit
ppm: parts per million

Section 4.3 Lighting Levels

Location	*Measured Illumination Level (fc)*	*Recommended Minimum Level (fc)*
Room 107E	122.9	50
Room 116E	**20.0**	50
Room 105-A	114.6	50
Room 105-1	80.6	50
Drill Hall North	4.5	3
Drill Hall South	6.0	3
First Floor Lobby	**14.0**	25
First Floor East Hall	19.0	3
2nd Floor North Hall	46.6	3
JI-H Hall	67.4	3
Room 304E	**36.9**	50
Armory Engineers Office 8G-E	**8.9**	50

fc: foot candles

Referenced recommended limits from ANSI RP-7-01 "Recommended Practice for Lighting Industrial Facilities", approved by ANSI July 26, 2001.

Section 4.4 Ghost Wipe Results

Sample ID/Location	*Results (ug/ft²)*	*HUD Regulatory Limit (ug/ft²)*
G-1/Room 107E Desk	<12	250
G-2/Pistol Range Floor	**5,200**	250
G-3/Bullet Trap Pistol Range	1,600	-
G-4/Pistol Range Adjacent Hall	<12	40
G-5/Drill Hall Floor South	<12	40
G-6/Drill Hall White Brick Wall	<110	250
G-7/Drill Red Brick Wall East	**380**	250
G-8/Drill Hall Exhaust Vent East	**18,000**	250
G-9/Drill Hall Return Vent	**15,000**	250
G-10/Room 107E Window Sill East	**3,200**	250
G-11/Top of Fire Ext. 1st Floor Adjacent to Drill Hall South	<12	40
G-12/Room 203 North Window Sill	<12	250
G-13/Top of Fire Ext. 2nd Floor North	<12	40
G-14/Bench Outside Room 304 East	<12	250

Sample ID/Location	*Results (ug/ft²)*	*HUD Regulatory Limit (ug/ft²)*
G-15/Room 305 East Desk	<12	250

Reference: HUD Lead Safe Housing Rule

Section 4.5 Paint Chip Results

Sample ID/Location	*Results (%Pb)*	*Regulatory Limit (%Pb)*
P-1/Stair 11 L-1 Wall	0.0091	0.5
P-3/Room 303E Ceiling	0.0081	0.5

Reference: EPA Lead in Paint Regulations

Section 4.6 ACM Results

Sample ID/Location	*Total Asbestos*	*Asbestos Content*
P-2/Room 105A Damaged Pipe Wrap	NAD	None Detected

Section 4.7 Lead in Air Results

Sample ID/Location	*Results (mg/m3)*	*Regulatory Limit (mg/m3)*
L-1/Pistol Range	<0.004	0.050
L-2/Drill Hall South	<0.004	0.050

Reference OSHA Title 29 CFR 1910

APPENDIX A: SITE DIAGRAM

APPENDIX B: REFERENCES

1. Department of Defense (October 25, 2004) Unified Facilities Criteria 3-410-04N, “Industrial Ventilation”.

2. Department of Defense (July 1, 2013) Unified Facilities Criteria 3-410-01FA, “Heating, Ventilating, and Air Conditioning”.

3. Department of the Army (November 27, 2013) Army Regulation 385-10 “The Army Safety Program”.

4. American National Standards Institute, RP-1-2004 “Office Lighting”.

5. American National Standards Institute, RP-7-2001 “Industrial Lighting”.

6. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. 55-2013, “Thermal Environmental Conditions for Human Occupancy”.

7. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. 62.1-2013, “Ventilation for Acceptable Indoor Air Quality”.

8. National Institute for Occupational Safety & Health, “Manual of Analytical Methods”.

9. Occupational Safety & Health Administration, “Title 29 CFR 1910”.

10. Environmental Protection Agency, “National Ambient Air Quality Standard”.

11. Occupational Safety & Health Administration, “Title 29 CFR 1926”.

12. Housing and Urban Development Lead Safe Housing Rules

APPENDIX C: SITE PHOTOGRAPHS

APPENDIX D: ANALYTICAL RESULTS