NATIONAL GUARD BUREAU
ARMY NATIONAL GUARD
REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

NGB-ARS-IHNE (40-5f) 5 September 2008

EXECUTIVE SUMMARY
LEAD SURFACE WIPE SAMPLING OF
FORMER INDOOR FIRING RANGE
BRISTOL, RI, 08 MAY 2008

1. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Bristol RI Armory.

2. CONCLUSION. The former IFR in the Bristol Armory is contaminated with lead and needs to be cleaned. Prior to occupation by children, any room should be given a normal housekeeping-type cleaning, ensuring all horizontal surfaces are wiped down with a damp cloth.

3. RECOMMENDATIONS.

   a. Decontamination Requirements. Clean any room with planned occupation by children and decontaminate the former IFR in accordance with guidance in National Guard Pamphlet 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

   b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

   c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

   d. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

   e. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

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LEAD SURFACE WIPE SAMPLING OF FORMER INDOOR FIRING RANGE BRISTOL, RI, 08 MAY 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Bristol RI Armory.

3. BACKGOUND.

   a. General.

      (1) The Environmental Office in the State of Rhode Island initiated a project to decontaminate and convert four of their former IFRs.

      (2) The National Guard Bureau (NGB) Region North Industrial Hygiene Office was contacted to provide assistance evaluating the extent of the lead contamination in the former IFR.

      (3) The NGB Region North Industrial Hygiene Office requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

   b. Survey Personnel. This survey was conducted 8 May 2008 by Non-Responsive Non-Responsive Regional Industrial Hygienist, from the NGB Region North Industrial Hygiene Office; Non-Responsive Industrial Hygienist, and CPT Non-Responsive Environmental Science Officer, both from USACHPPM–North, Fort George G. Meade, Maryland; and Non-Responsive Safety Manager, and SGT Non-Responsive Occupational Health / Industrial Hygiene Technician, both from the Rhode Island Army National Guard (RI-ARNG) Occupational Health Office.

4. METHODOLOGY.

a. Assessment Criteria.

(1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance with the Occupational Safety and Health Administration (OSHA) standards (reference 1).

(2) Department of the Army Pamphlet 40-503, Industrial Hygiene Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 2 and 3).

(3) National Guard Pamphlet (NG Pam) 420-15, section 1-4.b.(2) requires the results of clearance surface wipe samples to be under 200 micrograms of lead per square foot ($\mu g/ft^2$) (reference 4).

b. Methodology.

(1) Procedures. Surface wipe sampling methods were conducted in accordance with OSHA's Technical Manual, 5th edition (reference 5).

(2) Media. Ghost Wipes® were used for sample collection and were placed in 68mL HotBlock™ digestion vessels. Templates (10 cm x 10 cm) were used to ensure uniform wipe area.

(3) Lab Analysis. All samples were sent to AMA Analytical Services, Inc, and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

c. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table

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® Ghost Wipes is a registerd trademark of Environmental Express, Mt Pleasant, SC.
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from the DODI 6055.1 (reference 1). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. A welcome home ceremony is planned to take place at the Bristol Armory for a unit returning from overseas. During this celebration, Room 10 will be made available for children.

b. Prior Conversion. Prior to this visit, a partial conversion was attempted. The bullet trap, plenum components, and firing points were removed. The baffles and soundproofing material were left in place. Lockers were installed in the space.

c. Wipe Sampling. Surface wipe samples were collected from Room 9 (the exercise room), Room 10 (the children's room), Room 15 (the former IFR), and the Drill Floor. A list of sampling locations is presented in Appendix C of this report.

d. Results. Out of 27 samples collected, 12 tested positive for lead, with 10 of the 12 above 200 $\mu g/ft^2$, and 6 of the 10 above 900 $\mu g/ft^2$. Complete surface wipe sample results are provided in Appendix C of this report.

(1) Room 9 (Exercise). The results of all four samples collected in this room were below detectable limits.

(2) Room 10 (Children's). Only one of the ten samples collected in this room had results above detectable limits. The sample was taken from the top of a light fixture out of reach to children. Prior to occupation by children, this room should be given a normal housekeeping type cleaning, ensuring all horizontal surfaces are wiped down with a damp cloth.

(3) Room 15 (Former IFR). Results from all ten samples were positive for lead. Only two of the ten sample results were below 200 $\mu g/ft^2$.

(4) Drill Floor. One of the two samples collected in this area exceeded the 200 $\mu g/ft^2$ threshold.

6. CONCLUSION. The former IFR in the Bristol Armory is contaminated with lead and needs to be cleaned. Prior to occupation by children, any room should be given a normal housekeeping-type cleaning, ensuring all horizontal surfaces are wiped down with a damp cloth.

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 08 May 2008

7. RECOMMENDATIONS.

a. Decontamination Requirements. Clean any room with planned occupation by children and decontaminate the former IFR in accordance with guidance in National Guard Pamphlet 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

d. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

e. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive NGB Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

2. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

3. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

4. National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

5. Occupational Safety and Health Administration Technical Manual, TED 01-00-015 [TED 1-0.15A], 5th Edition.

6. Environmental Protection Agency (EPA) Method 600/R-93/200(M), Field Analysis of Lead in Paint, Bulk Dust, and Soil by Ultrasonic, Acid Digestion and Colorimetric Measurement, September 1993.

7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations (CFR), Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29 CFR Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

Taken From Table 2 of Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998. (reference 1)

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER POSSIBLE?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*HHSC*
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of *Exposure*	*Exposure Duration*		
	1-8 hr/wk	>8hr/wk, not continuous	Continuous
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	*Points*
<5	1-2
5 to 9	3-4
10 to 49	5-6
>49	7-8

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*IPC*
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	*ILLNESS PROBABILITY CODE*			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

4. RAC DESCRIPTOR

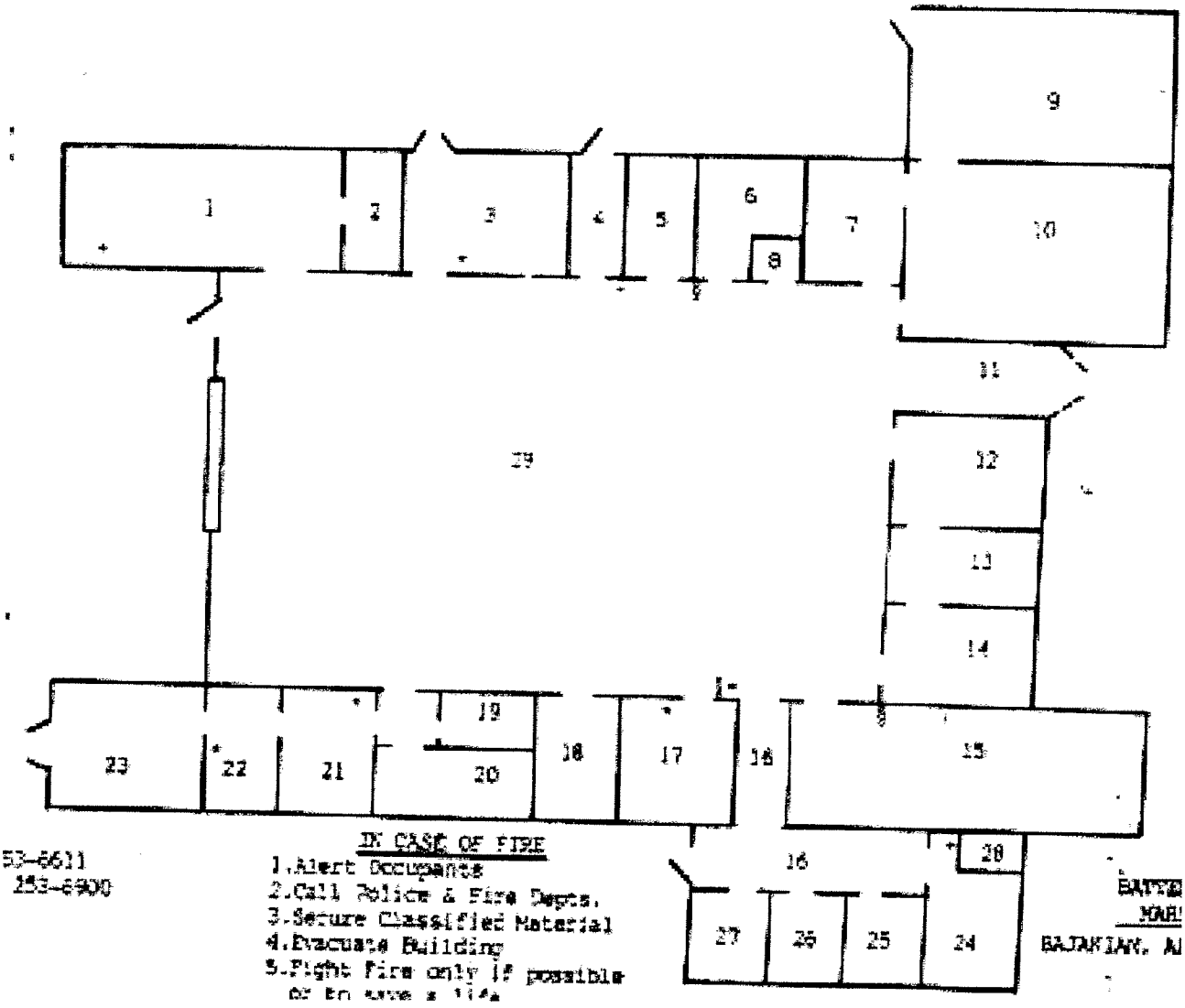
RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 08 May 2008

APPENDIX C
SURFACE WIPE SAMPLE RESULTS: BRISTOL, RI

Sample ID	Sample Location	Result ($\mu g/ft^2$)
Playroom		
BR1	Wooden table top, rear of room	<110
BR2	Top of bookshelf, rear of room	<110
BR3	Top of bookshelf, rear of room	<110
BR4	Under white bookshelf, rear of room	<110
BR5	Window ledge, next to last window, rear of room	<110
BR6	Around pipe next to wall unit	<110
BR7	Top of second light from rear of room	980
BR8	Floor, left wall, next to middle door	<110
BR9	Floor, right wall, front corner	<110
BR10	Floor, left wall, near front door	<110
BR11	BLANK	BDL
Former IFR / Locker Room		
BR12	Floor, corner near rear of range	170
BR13	Floor, front right corner near bullet stop	170
BR14	Floor, right wall, approx 20 feet from front	340
BR15	Floor, front left corner, near bullet stop	330
BR16	Top of wall locker, 2nd from front of range	580
BR17	Top of light fixture, left side, mid range	5400
BR18	Floor, right wall, 1/3 from rear of range	290
BR19	Top of fire fighting hose valve	14000
BR20	Top of wall locker, rear of range	1700
BR21	Floor, behind door	950
BR22	BLANK	BDL
Drill Floor		
BR23	Drill hall floor, next to range door	<110
BR24	Top of fire fighting hose valve	1400
BR Paint Chip	Chips from wall fallen on drill floor couch	<0.025% lead
Exercise Room		
BR25	Floor, rear left corner	<110
BR26	Top of light fixture, behind door	<110
BR27	Floor, rear right, left corner	<110
BR28	Floor, wall next to bar	<110

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 08 May 2008



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NGB-ARS-IHNE (40-5f) 5 September 2008

EXECUTIVE SUMMARY
LEAD SURFACE WIPE SAMPLING OF
FORMER INDOOR FIRING RANGE
BRISTOL, RI, 07 AUGUST 2008

1. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination into the equipment lockers located in the former Indoor Firing Range (IFR) in the Bristol RI Armory.

2. CONCLUSION. All lockers can be removed from the former IFR after a wipe-down of the outside of each locker (top included) with a wet cloth and/or a High Efficiency Particulate Air (HEPA) Vacuum.

3. RECOMMENDATIONS.

   a. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, head coverings, boots, glasses, etc.) during the locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132, reference 8)

   b. Employee Training. Provide training for the employees on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

   c. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

   d. Standing Operating Procedure. Follow the guidance in 29 CFR 1910.1025 as well as National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, when developing any SOP or converting any ranges. (**RAC 4**) (29 CFR 1910.1025, reference 9)

   e. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

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LEAD SURFACE WIPE SAMPLING OF FORMER INDOOR FIRING RANGE BRISTOL, RI, 07 AUGUST 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination into the equipment lockers located in the former Indoor Firing Range (IFR) in the Bristol RI Armory.

3. BACKGOUND.

   a. General.

      (1) In May 2008, wipe samples were collected in the former IFR of the Bristol Armory to determine the effectiveness of the previous clean-up and to determine if any lead dust remained. The results revealed the presence of residual lead throughout the IFR.

      (2) Follow-up sampling was recommended in order to determine if the lead contamination extended into the equipment lockers located in the former IFR.

      (3) The National Guard Bureau (NGB) Region North Industrial Hygiene Office requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

   b. Survey Personnel. This sampling project was conducted by Mr. [redacted] Industrial Hygienist, from USACHPPM-North, Fort Meade, Maryland. CPT [redacted] Occupational Health Nurse, and SGT [redacted] Occupational Health / Industrial Hygiene Technician, both with the Rhode Island Army National Guard (RI-ARNG) Occupational Health Office, and [redacted] Supervisor of Environmental Systems for the RI-ARNG, all assisted or observed during the sample collection.

4. METHODOLOGY.

a. Assessment Criteria.

(1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance with the Occupational Safety and Health Administration (OSHA) standards (reference 1).

(2) Department of the Army Pamphlet 40-503, Industrial Hygiene Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 2 and 3).

(3) National Guard Pamphlet (NG Pam) 420-15, section 1-4.b.(2) requires the results of clearance surface wipe samples to be under 200 micrograms of lead per square foot ($\mu g/ft^2$) (reference 4).

b. Methodology.

(1) Procedures. Surface wipe sampling methods were conducted in accordance with OSHA's Technical Manual, 5th edition (reference 5).

(2) Media. Ghost Wipes® were used for sample collection and were placed in 68mL HotBlock™ digestion vessels. Templates (10 cm x 10 cm) were used to ensure uniform wipe area.

(3) Lab Analysis. All samples were sent to AMA Analytical Services, Inc, and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

c. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table

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from the DODI 6055.1 (reference 1). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. Surface wipe samples were collected in nine unsecured lockers scattered throughout the room. Two surface wipes were collected from each locker and the locations were varied among the different shelves and drawers contained in the lockers. Personnel from the Armory were present the entire time the sampling team was in the former IFR.

b. Results. Only 2 of the 18 samples collected from inside the lockers came back positive for lead, and both of those were below 200 $\mu g/ft^2$. Wipe Sample results are provided in Appendix C of this report.

6. CONCLUSION. All lockers can be removed from the former IFR after a wipe-down of the outside of each locker (top included) with a wet cloth and/or a High Efficiency Particulate Air (HEPA) Vacuum.

7. RECOMMENDATIONS.

a. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, head coverings, boots, glasses, etc.) during the locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132, reference 8)

b. Employee Training. Provide training for the employees on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

c. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

d. Standing Operating Procedure. Follow the guidance in 29 CFR 1910.1025 as well as National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, when developing any SOP or converting any ranges. (**RAC 4**) (29 CFR 1910.1025, reference 9)

e. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 07 August 2008

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive NGB Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

2. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

3. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

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5. Occupational Safety and Health Administration Technical Manual, TED 01-00-015 [TED 1-0.15A], 5th Edition.

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7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations (CFR), Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29 CFR Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

Taken From Table 2 of Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998. (reference 1)

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER POSSIBLE?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*HHSC*
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of *Exposure*	*Exposure Duration*		
	1-8 hr/wk	>8hr/wk, not continuous	Continuous
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	*Points*
<5	1-2
5 to 9	3-4
10 to 49	5-6
>49	7-8

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 07 August 2008

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*IPC*
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	*ILLNESS PROBABILITY CODE*			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

4. RAC DESCRIPTOR

RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

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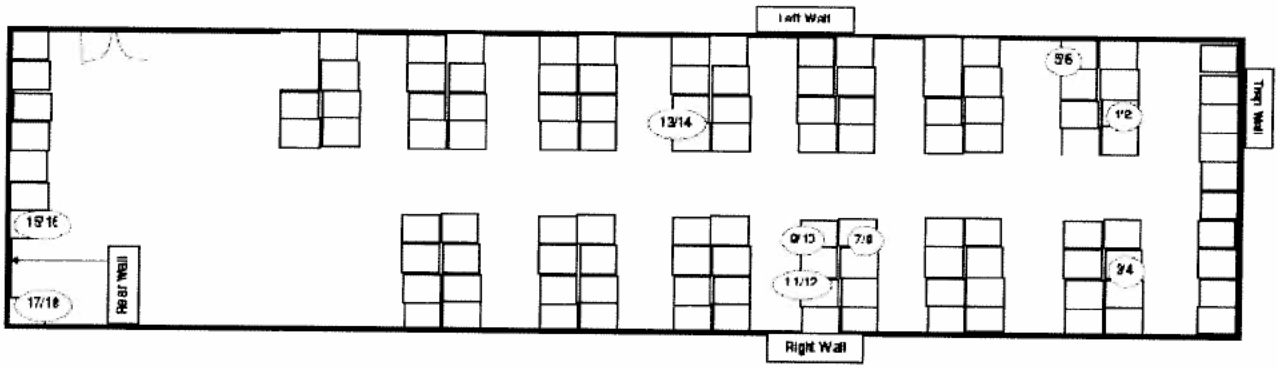
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Bristol, RI, 07 August 2008

APPENDIX C
SURFACE WIPE SAMPLE RESULTS: BRISTOL, RI

Sample Number	Result		Locker #	Shelf	Drawer	Corner	
RI BR 808 01	< 110	µg/ft²	74		Right	Front	Right
RI BR 808 02	< 110	µg/ft²	74	Bottom		Rear	Left
RI BR 808 03	< 110	µg/ft²	24	Bottom		Rear	Left
RI BR 808 04	< 110	µg/ft²	24	2nd from Bottom		Front	Right
RI BR 808 05	**160**	**µg/ft²**	**73**	**Bottom**		**Rear**	**Left**
RI BR 808 06	< 110	µg/ft²	73		Right	Front	Right
RI BR 808 07	< 110	µg/ft²	63	Bottom		Rear	Left
RI BR 808 08	< 110	µg/ft²	63		Bottom	Front	Right
RI BR 808 09	< 110	µg/ft²	35	Bottom		Rear	Left
RI BR 808 10	< 110	µg/ft²	35	Top		Front	Right
RI BR 808 11	< 110	µg/ft²	34	Bottom		Rear	Left
RI BR 808 12	< 110	µg/ft²	34	Bottom		Front	Right
RI BR 808 13	< 110	µg/ft²	58	Bottom		Rear	Left
RI BR 808 14	< 110	µg/ft²	58	2nd from Bottom		Rear	Right
RI BR 808 15	< 110	µg/ft²	47		Left	Front	Left
RI BR 808 16	< 110	µg/ft²	47		Right	Front	Right
RI BR 808 17	**130**	**µg/ft²**	**45**	**Bottom**		**Rear**	**Left**
RI BR 808 18	< 110	µg/ft²	45	Top		Front	Right
RI BR 808 Blank 05	< 12	µg					
RI BR 808 Blank 06	< 12	µg					



NATIONAL GUARD BUREAU
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REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

NGB-ARS-IHNE (40-5f) 5 September 2008

EXECUTIVE SUMMARY
LEAD SURFACE WIPE SAMPLING OF
FORMER INDOOR FIRING RANGE
MIDDLETOWN, RI, 08 AUGUST 2008

1. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Middletown RI Armory.

2. CONCLUSION. The conversion of the former IFR in the Middletown Armory was very effective. The wall in Room 4 where the positive samples were collected should be washed according to National Guard Pamphlet 420-15. No other cleaning is necessary.

3. RECOMMENDATIONS.

   a. Decontamination Requirements. Clean the contaminated surface in accordance with guidance in the NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

   b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the cleaning of the contaminated surface in the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

   c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

   d. Employee Awareness. Notify the employee of any air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

   e. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

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ATTN: NGB-ARS-IHNE
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LEAD SURFACE WIPE SAMPLING OF FORMER INDOOR FIRING RANGE MIDDLETOWN, RI, 08 AUGUST 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Middletown RI Armory.

3. BACKGOUND.

   a. General.

      (1) The Environmental Office in the State of Rhode Island initiated a project to decontaminate and convert four of their former IFRs.

      (2) The National Guard Bureau (NGB) Region North Industrial Hygiene Office was contacted to provide assistance evaluating the extent of the lead contamination in the former IFR.

      (3) The NGB Region North Industrial Hygiene Office requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

   b. Survey Personnel. This sampling project was conducted by Mr. [redacted] Non-Responsive Industrial Hygienist, from USACHPPM-North, Fort Meade, Maryland.

4. METHODOLOGY.

   a. Assessment Criteria.

      (1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance

with the Occupational Safety and Health Administration (OSHA) standards (reference 1).

(2) Department of the Army Pamphlet 40-503, Industrial Hygiene Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 2 and 3).

(3) National Guard Pamphlet (NG Pam) 420-15, section 1-4.b.(2) requires the results of clearance surface wipe samples to be under 200 micrograms of lead per square foot ($\mu g/ft^2$) (reference 4).

b. Methodology.

(1) Procedures. Surface wipe sampling methods were conducted in accordance with OSHA's Technical Manual, 5th edition (reference 5).

(2) Media. Ghost Wipes® were used for sample collection and were placed in 68mL HotBlock™ digestion vessels. Templates (10 cm x 10 cm) were used to ensure uniform wipe area.

(3) Lab Analysis. All samples were sent to AMA Analytical Services, Inc, and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

c. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table from the DODI 6055.1 (reference 1). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. Prior to this visit, a comprehensive conversion was conducted. The bullet trap, baffles, and firing points were removed. The plenum wall

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™ HotBlock is a trade mark of Environmental Express, Mt Pleasant, SC.

and ductwork were left intact. Four rooms were constructed in the remaining space, each with lockers, storage, and desks/tables.

b. Wipe Sampling. Surface wipe samples were collected in accordance with the guidance provided in NG Pam 420-15. In addition, three samples were collected in the hallway outside the former IFR. A list of sampling locations is presented in Appendix C of this report.

c. Results. Out of 17 samples collected, 2 tested positive for lead, and only 1 of those 2 was above 200 $\mu g/ft^2$. Complete surface wipe sample results are provided in Appendix C of this report.

6. CONCLUSION. The conversion of the former IFR in the Middletown Armory was very effective. The wall in Room 4 where the positive samples were collected should be washed according to National Guard Pamphlet 420-15. No other cleaning is necessary.

7. RECOMMENDATIONS.

f. Decontamination Requirements. Clean the contaminated surface in accordance with guidance in the NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

g. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the cleaning of the contaminated surface in the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

h. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

i. Employee Awareness. Notify the employee of any air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

j. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Middletown, RI, 08 August 2008

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive NGB Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

2. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

3. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

4. National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

5. Occupational Safety and Health Administration Technical Manual, TED 01-00-015 [TED 1-0.15A], 5th Edition.

6. Environmental Protection Agency (EPA) Method 600/R-93/200(M), Field Analysis of Lead in Paint, Bulk Dust, and Soil by Ultrasonic, Acid Digestion and Colorimetric Measurement, September 1993.

7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations (CFR), Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29 CFR Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

Taken From Table 2 of Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998. (reference 1)

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER POSSIBLE?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*HHSC*
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of *Exposure*	*Exposure Duration*		
	1-8 hr/wk	>8hr/wk, not continuous	Continuous
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	*Points*
<5	1-2
5 to 9	3-4
10 to 49	5-6
>49	7-8

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*IPC*
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	*ILLNESS PROBABILITY CODE*			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

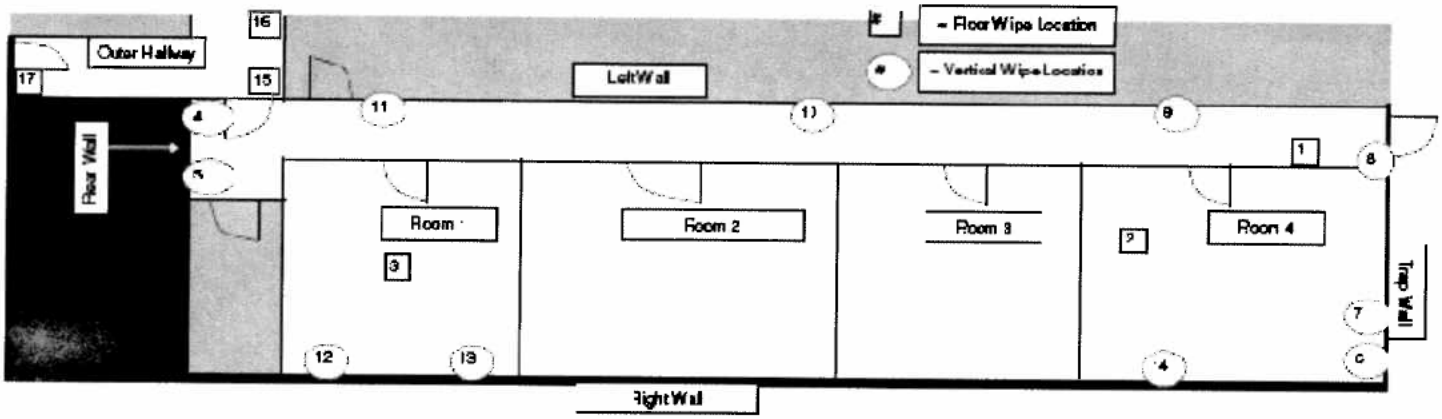
4. RAC DESCRIPTOR

RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Middletown, RI, 08 August 2008

APPENDIX C
SURFACE WIPE SAMPLE RESULTS: MIDDLETOWN, RI

Sample	Result		Location	Area	Distance From Wall: Trap	Rear	Left	Right	Vertical Ht
1	< 110	µg/ft²	Floor	Inner Hallway	1ft		3 ft		
2	< 110	µg/ft²	Floor	Room 4	15 ft		12 ft		
3	< 110	µg/ft²	Floor	Room 1		15 ft	12 ft		
4	< 110	µg/ft²	Wall, Rear	Plenum Area			Adjacent		3rd Block
5	< 110	µg/ft²	Wall, Rear	Plenum Area			9ft		8th Block
6	150	µg/ft²	Wall, Trap	Room 4				Adjacent	3rd Block
7	2200	µg/ft²	Wall, Trap	Room 4				5 ft	5th Block
8	< 110	µg/ft²	Wall, Trap	Inner Hallway			3 ft		9th Block
9	< 110	µg/ft²	Wall, Left	Inner Hallway	15 ft				3rd Block
10	< 110	µg/ft²	Wall, Left	Inner Hallway	39 ft				6th Block
11	< 110	µg/ft²	Wall, Left	Inner Hallway	80 ft				9th Block
12	< 110	µg/ft²	Wall, Right	Room 1		12 ft			5th Block
13	< 110	µg/ft²	Wall, Right	Room 1		21 ft			2nd Block
14	< 110	µg/ft²	Wall, Right	Room 4	15 ft				9th Block
15	< 110	µg/ft²	Floor	Outer Hallway	In corner to left of door as you enter the old range.				
16	< 110	µg/ft²	Floor	Outer Hallway	21 ft from range door, under electric outlet.				
17	< 110	µg/ft²	Floor	Outer Hallway	In corner to right of door as you exit the building.				



NATIONAL GUARD BUREAU
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NGB-ARS-IHNE (40-5f) 10 September 2008

EXECUTIVE SUMMARY
INDUSTRIAL HYGIENE AIR MONITORING
INDOOR FIRING RANGE DECONTAMINATION
WARREN, RI
27 AUGUST 2008

1. PURPOSE. The purpose of this study was to monitor airborne concentrations of lead and evaluate the potential occupational exposure of the workers performing the decontamination and cleaning of a former indoor firing range (IFR).

2. CONCLUSION. During this former IFR renovation project, the workers' overall occupational exposures were very low. None of the six sample results were above detectable limits. Also, all workers were protected by properly using adequate PPE throughout the operation. The planning prior to the start of this cleaning/decontamination procedure was successful. Future operations that are similar in nature should follow the procedures developed and used during this project, to include air sampling of the individuals performing the operation.

3. RECOMMENDATIONS.

   a. PPE. Wear appropriate PPE (P100 filtering facepiece respirator, coveralls, gloves, boots, goggles, etc.) throughout any future indoor firing range (IFR) decontamination projects. (**RAC 3**) (29 CFR 1910.132(a) and 1910.1025(g), references 8 and 9)

   b. Employee Awareness. Notify the employee of the occupational air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(5), reference 9)

   c. Standard Operating Procedure. When this operation is performed again in the future, follow the same procedures as listed in National Guard Pamphlet 420-15. (**RAC 4**) (NG Pam 420-15, reference 1)

   d. Continued Occupational Assessment. Provide worker surveillance during any future IFR decontamination or cleaning projects. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(d)(4), reference 9)

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REGION NORTH INDUSTRIAL HYGIENE OFFICE
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INDUSTRIAL HYGIENE AIR MONITORING INDOOR FIRING RANGE DECONTAMINATION WARREN, RI 27 AUGUST 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this study was to monitor airborne concentrations of lead and evaluate the potential occupational exposure of the workers performing the decontamination and cleaning of a former indoor firing range (IFR).

3. BACKGOUND.

   a. General.

      (1) The Environmental Office in the State of Rhode Island initiated a project to decontaminate and convert four of their former IFRs.

      (2) The National Guard Bureau (NGB) Region North Industrial Hygiene Office was contacted to provide assistance evaluating the extent of the lead contamination in the former IFR.

      (3) The NGB Region North Industrial Hygiene Office then requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

      (4) Lead surface wipe samples were collected from the former IFR in the Warren Armory on 7 August 2008 and revealed the presence of lead in the facility. Further information can be found in the Warren Armory report dated 5 September 2008.

      (5) In accordance with National Guard Pamphlet (NG Pam) 420-15, the Rhode Island Army National Guard (RI-ARNG) Surgeon's Office requested air sampling of the workers during the decontamination and cleaning of their former IFRs. USACHPPM-North was asked to assist with collecting these breathing zone (BZ) air samples (reference 1).

b. Personnel Conducting Operation. The RI-ARNG M-Day Soldiers performing the decontamination and clean-up at the Warren Armory are Non-Responsive and Non-Responsive All personnel attended lead training conducted by the RI Environmental Office as well as a briefing where the monitoring procedures and reasoning for sampling were explained.

c. Study Personnel. This study was conducted by Mr. Non-Responsive Industrial Hygienist, from USACHPPM-North, Fort Meade, Maryland.

4. METHODOLOGY.

a. Assessment Criteria.

(1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance with the Occupational Safety and Health Administration (OSHA) standards (reference 2).

(2) Department of the Army Pamphlet 40-503, IH Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 3 and 4).

b. Calibration. All air monitoring instruments used in this study were calibrated in accordance with manufacturers' procedures using a TSI® Model 4146 Primary Calibrator (s/n 4146 0826 004) which had been calibrated against National Institute of Standards and Technology-traceable instruments in June 2008.

c. Methodology.

(1) Procedures. Sampling methods and procedures were performed in accordance with USACHPPM Technical Guide (TG) 141, Industrial Hygiene Sampling Instructions and NG Pam 420-15, Guidelines and

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Procedures for Rehabilitation and Conversion of Indoor Firing Ranges (references 1 and 5).

(2) Air Samples. One personal BZ air sample per each soldier was collected during this study using SKC Airchek Sampler® pumps calibrated to approximately 2.0 liters per minute (LPM) for the lead cassettes (SKC 37 millimeter, 3 piece cassettes, with 0.8 micrometer mixed cellulose ester (MCE) filters).

(3) Lab Analysis. All samples were sent for analysis to AMA Analytical Services, Inc., in Lanham, Maryland and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

d. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table from the DODI 6055.1 (reference 2). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. A team of six personnel were working to renovate the former IFR in the Warren Armory. They had applied administrative controls and were using a rotating shift pattern to limit the amount of time any one Soldier spent working in the contaminated area. When not in that area, the Soldiers were wiping down all equipment, shelving, and lockers that had been stored in the former IFR.

b. Personal Protective Equipment (PPE). Personal protective equipment was used as an important element of worker protection. The following forms of PPE were worn by all individuals participating in this operation: Tyvek® coveralls and booties, disposable gloves, P100 filtering facepiece respirators, and safety glasses/goggles were all used while working in the former IFR.

c. Air Sampling Results.

(1) Six BZ samples were collected from the workers during the one day sampling project. Each sample was analyzed for lead.

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® Tyvek is a registered trademark of E. I. du Pont de Nemours and Company

(2) A complete listing air sampling results and other information is located in Appendix C.

(3) All six samples were calculated into 8-hour Time Weighted Averages (TWA_8). Every sample result was reported as below detectable limits (BDL), which means the actual result for that sample could be zero or is somewhere between zero and the value listed as the detectable limit. In this report, all samples reported BDL will have a less than (<) sign and then list the detectable limit.

(4) The highest limit of detection reported was <0.0031 mg/m^3 when converted to TWA_8. This is well below the ACGIH TLV for lead, which is 0.05 mg/m^3. In this case, Lead was not a significant health hazard for this process.

6. CONCLUSION. During this former IFR renovation project, the workers' overall occupational exposures were very low. None of the six sample results were above detectable limits. Also, all workers were protected by properly using adequate PPE throughout the operation. The planning prior to the start of this cleaning/decontamination procedure was successful. Future operations that are similar in nature should follow the procedures developed and used during this project, to include air sampling of the individuals performing the operation.

7. RECOMMENDATIONS.

a. PPE. Wear appropriate PPE (P100 filtering facepiece respirator, coveralls, gloves, boots, goggles, etc.) throughout any future indoor firing range (IFR) decontamination projects. (**RAC 3**) (29 CFR 1910.132(a) and 1910.1025(g), references 8 and 9)

b. Employee Awareness. Notify the employee of the occupational air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(5), reference 9)

c. Standard Operating Procedure. When this operation is performed again in the future, follow the same procedures as listed in National Guard Pamphlet 420-15. (**RAC 4**) (NG Pam 420-15, reference 1)

d. Continued Occupational Assessment. Provide worker surveillance during any future IFR decontamination or cleaning projects. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(d)(4), reference 9)

NGB-ARS-IHNE
SUBJECT: Industrial Hygiene Air Monitoring during an Indoor Firing Range Decontamination, Warren, RI, 27 August 2008

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

2. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

3. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

4. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

5. United States Army Center for Health Promotion and Preventive Medicine Technical Guide 141, Industrial Hygiene Sampling Instructions, February 2005.

6. Environmental Protection Agency (EPA) Method 600/R-93/200(M), Field Analysis of Lead in Paint, Bulk Dust, and Soil by Ultrasonic, Acid Digestion and Colorimetric Measurement, September 1993.

7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations, Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29, Code of Federal Regulations, Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

(Taken from Table 2 of DODI 6055.1 (reference 2))

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER Possible?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	HHSC
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of Exposure	Exposure Duration		
	1-8 hr/wk	> 8hr/wk, not continuous	Continuous
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	Points
< 5	1-2
5 to 9	3-4
10 to 49	5-6
> 49	7-8

NGB-ARS-IHNE
SUBJECT: Industrial Hygiene Air Monitoring during an Indoor Firing Range Decontamination, Warren, RI, 27 August 2008

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	IPC
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	ILLNESS PROBABILITY CODE			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

4. RAC DESCRIPTOR

RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

NGB-ARS-IHNE
SUBJECT: Industrial Hygiene Air Monitoring during an Indoor Firing Range Decontamination, Warren, RI, 27 August 2008

APPENDIX C
SAMPLE RESULTS

Table C1.1 – Calculated Results

	CALCULATED TWA_8 (mg/m^3)						PEL/TLV TWA_8 (mg/m^3)
Analyte	**RIWN82701**	**RIWN82702**	**RIWN82703**	**RIWN82704**	**RIWN82705**	**RIWN82706**	
Worker	8962	4093	2558	0541	8190	7040	
Lead	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	0.05

Table C1.1 lists the calculated results for the samples collected each day for that person/location. All values listed with a less than (<) sign used the limit of detection during the conversion. The applicable standard is also listed in the far right-hand column.

Table C1.2 – Sample Results from Laboratory (Before Conversion)

	SAMPLE RESULT (mg/m^3)					
Analyte	**RIWN82701**	**RIWN82702**	**RIWN82703**	**RIWN82704**	**RIWN82705**	**RIWN82706**
Lead	< 0.0065	< 0.0068	< 0.0070	< 0.0070	< 0.0069	< 0.0069

Table C1.2 limit of detection (listed with less than (<) sign) obtained from the laboratory before any calculations or conversions were applied.

Table C1.3 – Sampling Data

	RIWN82701	**RIWN82702**	**RIWN82703**	**RIWN82704**	**RIWN82705**	**RIWN82706**
Worker	8962	4093	2558	0541	8190	7040
Date	7-27-08	7-27-08	7-27-08	7-27-08	7-27-08	7-27-08
Pump	647732	672027	647926	733608	733831	733802
Pre Cal Value	2.06 LPM	2.02 LPM	2.02 LPM	2.02 LPM	2.08 LPM	2.10 LPM
Post Cal Value	2.10 LPM	2.03 LPM	2.01 LPM	2.04 LPM	2.05 LPM	2.07 LPM
% Difference	1.90 %	0.49 %	0.50 %	0.98 %	1.44 %	1.43 %
Flow Rate	2.08 LPM	2.025 LPM	2.015 LPM	2.03 LPM	2.065 LPM	2.085 LPM
Total Time	222 min	219 min	214 min	212 min	209 min	209 min
Total Volume	462 L	443 L	431 L	430 L	432 L	436 L

Table C1.3 contains all relevant sampling data for the individuals sampled.

URS

Prepared For:

National Guard Bureau
Army National Guard
Region North Industrial Hygiene Office
301 – IH Old Bay Lane
Havre De Grace, Maryland 21078

Prepared By:

URS Corporation
5 Industrial Way
Salem, New Hampshire 03079

INDUSTRIAL HYGIENE SURVEY REPORT
BRISTOL ARMORY
BRISTOL, RHODE ISLAND

January 2006
PN: 39741508

Non-Responsive
Office Manager

Non-Responsive
Project Manager

TABLE OF CONTENTS

TABLE OF CONENTS (Cont)

APPENDICES

FINDINGS AND RECOMMENDATIONS

Findings	Recommendation	Risk Assessment Code
Lighting		
On the day of the survey, the illuminance in the administrative area was inadequate in the areas tested.	Increase lighting throughout. While work is in progress, illuminate areas through use of task lighting (ANSI / IESNA RP-1-04)	RAC 4
Lead		
Lead was detected in wipe samples collected from the former firing range in amounts greater than 200 $\mu g/ft^2$	Personnel trained in accordance with the OSHA Lead Standard should clean the former firing range where lead was detected in quantities of greater than 200 micrograms per square foot (OSHA 29 CFR 1910.1025(h)(1))	RAC 4
Asbestos		
A site-specific asbestos operations and maintenance plan was available.	Implement the site specific asbestos operations and maintenance plan to manage asbestos-containing materials (OSHA 29 CFR 1910.1001(j))	RAC 3
Hazard Communication		
Material safety data sheets were not available on site.	Material safety data sheets must be available in the workplace for each hazardous chemical which is used (OSHA 29 CFR 1910.1200(g)(1).	RAC 4
Secondary containers did not have labels.	Label all secondary containers not intended for immediate use (OSHA 29CFR1910.1200(f)(5))	RAC 4
No inventory list of the site's chemicals was provided.	Conduct an annual hazardous chemical inventory annually (OSHA 29 CFR 1910.1200(e)(1(i))	RAC 4
Electrical Safety		
An electrical panel was observed to be open in the boiler room	Panels must be kept "effectively closed" (OSHA 29 CFR 1910.305(b)(1)).	RAC 2
Housekeeping		
The work floor in the boiler room was cluttered creating numerous trip hazards.	All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition (OSHA 29 CFR 1910.22(a)(1).	RAC 3

1.0 SUMMARY

At the request of the National Guard Bureau Region North Industrial Hygiene Office (NGB), URS Corporation (URS) conducted an industrial hygiene survey at the Bristol Armory located on 470 Metacom Avenue, Bristol, Rhode Island 02809.

URS' representatives, Mr. Non-Responsive and Mr. Non-Responsive conducted the Industrial Hygiene Survey on December 4, 2003. The scope of work included an overall assessment of the facility as it relates to industrial hygiene, including a walk-through of the facility, collection of photos, wipe samples for lead, asbestos and paint chip sampling when applicable and measurements for illumination (lighting).

The Bristol Armory is a single story brick structure built on a concrete slab. The building was constructed in the 1951 and consists of office space, a drill floor and storage space. A former firing range is located in the building and is currently being used as a locker room.

At the time of the inspection, the Armory was undergoing a renovation project that included the removal of asbestos-containing materials (ACM) in the form of vinyl floor tile and thermal system insulation. URS spoke with the Rhode Island Army National Guard Construction Manager and was informed that asbestos-containing materials in the pipe chases were to remain in place (Photos # 2598, 2599, 2600, and 2601). During the walk through URS noticed that the asbestos-containing floor tile mastic was not removed as part of the project (Photos # 2602, 2613, 2614, 2615, 2616, and 2617). URS was informed that this material will simply be covered. URS also observed a section of piping with thermal system insulation that had been removed from the building (Photo # 2604). Although the material was wrapped in polyethylene it was not labeled and was not being properly stored. An asbestos operations and maintenance plan is required under U. S. Occupational Safety and Health Administration (OSHA) regulations with the following minimum elements: Awareness training for all in-house trade workers, maintenance and housekeeping personnel; notification to building occupants and outside vendors; labeling of ACM; and periodic surveillance of ACM.

2.0 ADMINISTRATIVE AREA

2.1 Operation Description

The majority of the building consists of offices and the drill floor. Vinyl asbestos floor tiles were in good condition where not removed. Cigarette smoking was allowed within the building as evidenced by the number of dirty ashtrays.

2.2 Chemical and Physical Agents Sampled

2.2.1 Relative Humidity

Relative humidity levels were measured using a TSI Q-Track (Model 8551). Relative humidity on the day of the survey ranged from 11.7 – 13.4% with an average of 12.6%. These readings were below the 65% upper limit recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ANSI / ASHRAE Standard 62.1-2004).

2.2.2 Carbon Dioxide

On the day of the survey, carbon dioxide measurements were made at various locations throughout the Armory. Carbon dioxide concentrations ranged from 454 to 501 parts per million (ppm), with an average of 476 ppm. Carbon dioxide levels were measured using a direct-reading TSI Q-Track (Model 8551).

Carbon dioxide is a normal constituent of the atmosphere and ranges from about 250 to 450 ppm. The major source of excess carbon dioxide in the indoor environment is people. Other sources can include open-flame heaters, fermentation processes, and motor vehicles. Carbon dioxide itself is not normally a cause of indoor air quality problems because concentrations must exceed 5,000 to 10,000 ppm before health effects such as headache, drowsiness, and increased respiration are noted. Typically, carbon dioxide is used as an indicator of the adequacy of fresh air intake. As the

concentration of carbon dioxide increases, so do the background levels of other air contaminants.

ASHRAE (62.1-2004) recommends that levels of carbon dioxide be maintained below 700 ppm above background level. Since the average interior reading was below 700 ppm an exterior reading was not made.

2.2.3 Carbon Monoxide

Carbon monoxide was also measured in the Readiness Center. The carbon monoxide concentration remained at 0 ppm throughout the survey period. This measured level were below the ASHRAE guideline (62.1-2004) for indoor environments. Carbon monoxide was measured using a TSI Q-Track (Model 8551).

Key sources of carbon monoxide within indoor environments include internal combustion engines, motor vehicle and forklift exhaust, tobacco smoke, space heaters, and improperly adjusted oil or gas burners. Health effects from exposure to elevated concentrations of carbon monoxide may include fatigue, impairment of visual acuity, irregular heartbeat, headache, nausea, and confusion. ASHRAE (62.1-2004) recommends that average carbon monoxide concentrations not exceed 9 ppm. Typical average concentrations found in commercial buildings range from 0 to 6 ppm.

2.2.4 Lighting

Lighting in the administrative area was measured using a Sper Scientific Ltd. Light Meter (Model 840020C). Table 2-1 below shows lighting measurements and the recommended lighting requirement ANSI / IESNA RP –1-04 American National Standard Practice for Office Lighting – Table B-1).

Table 2-1
Lighting Measurements and Recommended Lighting Requirements

Location	Function	Measured Illuminance (lux / foot candles)	Recommended Minimum Illuminance (lux / foot candles)
Classroom	Administrative	70 / 6.5	500 / 50
Rear Office	Administrative	396 / 36.8	500 / 50
Lounge	Administrative	289 / 26.8	500 / 50
FDC Room	Administrative	155 / 14.4	500 / 50
Locker room	Supply Room	10 / 0.9	50 / 5

On the day of the survey the illuminance in the administrative area was inadequate in each of the offices tested.

2.2.5 Lead

Wipe testing for lead was conducted in the Administrative Area using Ghost Wipes™, which meet ASTM E 1792 standards. The analytical report from AMA Analytical Services, Inc. (AMA) is contained in Appendix D. Table 2-2 below shows the results of the lead sampling.

Table 2-2
Levels of Lead in Dust in the Administrative Area

ID	Location	Photo #	Result
1120-01	Foyer	2605	<12 µg / foot^2
1120-09	Room 17	2616	54 µg / foot^2
1120-10	Ammo Room		96 µg / foot^2

OSHA has no specific requirement for lead contamination on 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 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.

OSHA used to cite a level of 200 µg / foot^2 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.

On the day of the survey, the airborne lead dust level in the break area was found to be below the OSHA action level of 30.0 µg/m^3 averaged over an 8-hour day. The result of this sample is contained in Table 2-3.

Table 2-3
Level of Lead Found in Air

ID	Location	Result
1120-14	Field Blank	<3 µg
1120-15	Break Area	<17 µg / cubic meter

Sample number and location can be found on the site map in Appendix A.

2.2.6 Asbestos

URS collected one air sample for asbestos fibers in the drill hall. The area sample was collected using a low-flow personal air sampling pump and a three piece mixed cellulose ester filter cassette, having a membrane pore size of 0.8 um. The sample was analyzed using the NIOSH 7400 method for Phase Contrast Microscopy (PCM). The result of this asbestos air sample is contained in table 2-4 below.

Table 2-4
Asbestos Air Sample Result

ID	Location	Result
1120-17	Drill Hall Center	0.007 Fibers/ square centimeter
1120-18	Field Blank	0 fibers / field
1120-19	Field Blank	0 fibers / field

2.3 Ventilation System Evaluation

Not applicable to this operation.

2.4 Noise Measurements

Not applicable to this operation.

2.5 Personal Protective Equipment

Not applicable to this operation.

2.6 Interpretation of Results

GENERAL: In general, the administrative area was neat and orderly.

LIGHTING: On the day of the survey, the illuminance in the administrative area was inadequate in the offices tested. URS recommends increasing lighting in the administrative areas through the use of task lighting.

ASBESTOS: Asbestos-containing floor tile mastic was present in many of the administrative areas. If this material is to remain in place then an Asbestos Operations and Maintenance Plan should be implemented to manage the materials in place.

3.0 FORMER FIRING RANGE

3.1 Operation Description

The firing range has been dismantled and is now used as a locker room.

3.2 Chemical and Physical Agents Sampled

3.2.1 Lead

Wipe testing for lead was conducted in the former firing range using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 3-1 below shows the results of the lead sampling.

Table 3-1
Levels of Lead Dust Found in the Former Firing Range

ID	Location	Photo #	Result
1120-04	Former Rifle Range West	2608	85 μg / foot^2
1120-05	Former Rifle Range East	2609	110 μg / foot^2
1120-06	Former Rifle Range West Ledge, South Wall	2610	430 μg / foot^2
1120-07	Former Rifle Range Center, Top of Light	2611	5,000 μg / foot^2
1120-08	Former Rifle Range East, Top of Locker	2612	750 μg / foot^2

OSHA has no specific requirement for lead contamination on 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 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.

OSHA used to cite a level of 200 μg/ft^2 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.

3.3 Ventilation System Evaluation

Not applicable to this operation.

3.4 Noise Measurements

Not applicable to this operation.

3.5 Personal Protective Equipment

Not applicable to this operation.

3.6 Interpretation of Results

LEAD: Three of the five surface wipe samples collected in the former firing range were found to contain lead dust levels which exceeded the maximum limit set by the National Guard Bureau (See Appendix G). URS recommends that an appropriately licensed lead contractor clean the former firing range, additional information regarding the cleaning of indoor firing ranges can be found in Appendix H.

4.0 DRILL HALL

4.1 Operation Description

The drill hall is used for unit formations and activities as well as for storing equipment. It has a concrete floor and cinder-block walls.

4.2 Chemical and Physical Agents Sampled

4.2.1 Lighting

Lighting in the Drill Hall was measured using a Sper Scientific Ltd. Light Meter (Model 840020C). Table 4-1 below shows lighting measurements and the recommended lighting requirement ANSI/IESNA RP –1-04 American National Standard Practice for Office Lighting).

Table 4-1
Lighting Measurements and Recommended Lighting Requirements

Location	Function	Measured Illuminance (lux / foot candles)	Recommended Minimum Illuminance (lux / foot candles)
Drill Floor Center	Assembly Area (Construction area)	246 / 22.6	300 / 30

On the day of the survey the illuminance in the Drill Hall was inadequate.

4.2.2 Lead

Wipe testing for lead dust was conducted in the drill hall using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 4-2 below shows the results of the lead sampling.

Table 4-2
Levels of Lead Dust Found in the Drill Hall

ID	Location	Photo #	Result
1120-02	Drill Floor West	2606	27 µg / foot^2
1120-03	Drill Floor East	2607	38 µg / foot^2

One air sample for lead dust was collected in the drill hall. Table 4-3 below shows the result of this air sample.

Table 4-3
Level of Lead Found in the Air

ID	Location	Result
1120-14	Field Blank	<3 µg / cubic meter
1120-16	Drill Floor Center	<10 µg / cubic meter

On the day of the survey, the airborne lead dust level in the drill hall was found to be below OSHA's permissible exposure limit (PEL) for lead (29 CFR 1910.1025(c)) of 50.0 $\mu g/m^3$ averaged over an 8-hour day.

4.3 Ventilation System Evaluation

Not applicable to this operation.

4.4 Noise Measurements

Not applicable to this operation.

4.5 Personal Protective Equipment

Not applicable to this operation.

4.6 Interpretation of Results

LEAD: The surface wipe sample collected in this area for lead was found to be within the allowable limits and requires no further action at this time.

5.0 BOILER ROOM / BASEMENT AREA

5.1 Operation Description

The boiler room is a mechanical space constructed with a concrete floor and cinderblock walls, containing a furnace and associated piping. At the time of the survey this area was in disarray. There were no contractors currently working in the boiler room and poor housekeeping was evident by the numerous trip hazards observed in this area (Photo #2596 and #2597). Electrical panels had been opened and were left disassembled (Photo #2596 and #2597). A confined space was not labeled in this area. As part of the building renovation the access to this confined space was scheduled to be sealed. Asbestos observed in the crawlspace was in poor condition.

5.2 Chemical and Physical Agents Sampled

No chemical or physical agents were sampled in this area.

5.3 Ventilation System Evaluation

Not applicable to this operation.

5.4 Noise Measurements

Not applicable to this operation.

5.5 Personal Protective Equipment

Not applicable to this operation.

5.6 Interpretation of Results

ELECTICAL SAFETY: An electrical panel was observed to be open in the boiler room. Panels must be kept "effectively closed" (OSHA 29 CFR 1910.305(b)(1)).

HOUSEKEEPING: The work floor in the boiler room was cluttered creating numerous trip hazards. All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition (OSHA 29 CFR 1910.22(a)(1).

6.0 SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

6.1 Confined Spaces

A confined spaces program conforming to the requirements of OSHA 29 CFR 1910.146 was readily available on site.

6.2 Hearing Conservation

A written hearing conservation program was found on site. This is in compliance with the OSHA occupational noise exposure standard 29 CFR 1910.95, Department of the Army Pamphlet 40-501, and DoD instruction 6055.12, Hearing conservation Program (HCP).

6.3 Respiratory Protection

A written respiratory protection program was found on site. This is in compliance with the OSHA respiratory protection standard 29 CFR 1910.134.

6.4 Hazard Communication

A site specific written hazard communication (HAZCOM) program was available on site. Components of a HAZCOM program include an inventory of hazardous chemicals, material safety data sheets (MSDS) and training. The site did not have a hazardous chemical inventory or MSDS readily available. Photo # 315 also shows a secondary container without any labels. This container was stored in the flammable materials locker.

6.5 Personal Protective Equipment

No safety program was found regarding personal protective equipment. No training records were found on site. A written personal protection equipment program is not required for this site.

6.6 Asbestos Operations and Maintenance Program

An asbestos operations and maintenance program was not available on site. In order to comply with the OSHA General Industry Standard, 29 CFR 1910.1001, the facility

owner should implement an asbestos operations and maintenance program by performing the following:

- Awareness training for all in-house trade workers, maintenance and housekeeping personnel.
- Notification to building occupants and outside vendors.
- Labeling of ACM.
- Periodic surveillance of ACM.

7.0 REFERENCES

American National Standards Institute

ANSI/ESNA RP-1-04: American National Standard Practice for Office Lighting

American Society of Heating Refrigerating and Air-Conditioning Engineers

ANSI/ASHRAE Standard 55-2004: Thermal Environmental Conditions for Human Occupancy

ANSI/ASHRAE Standard 62.1-2004: Ventilation for Acceptable Indoor Air Quality

Department of the Army

Ergonomics Program Pamphlet 40-21 (15 August 2003)

Policy and Responsibilities For Inspection, Evaluation and Operation of Army National Guard Indoor Firing Ranges (National Guard Regulation 385-15, 30 December 2002)

Department of Defense

DoD Hearing Conservation Program Standard 6055.12 April 1996

Creating an Ideal Workstation: A Step-by-Step Guide

U. S. Environmental Protection Agency

Asbestos Hazard Emergency Response Act (40 CFR Part 763)

National Emissions Standards for Hazardous Pollutants (40 CFR Part 61)

U. S. Housing and Urban Development

Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (1995, 1997)

U. S. Occupational Safety and Health Administration

Standard for General Industry: 29 CFR 1910

APPENDIX A

ARMORY DRAWING

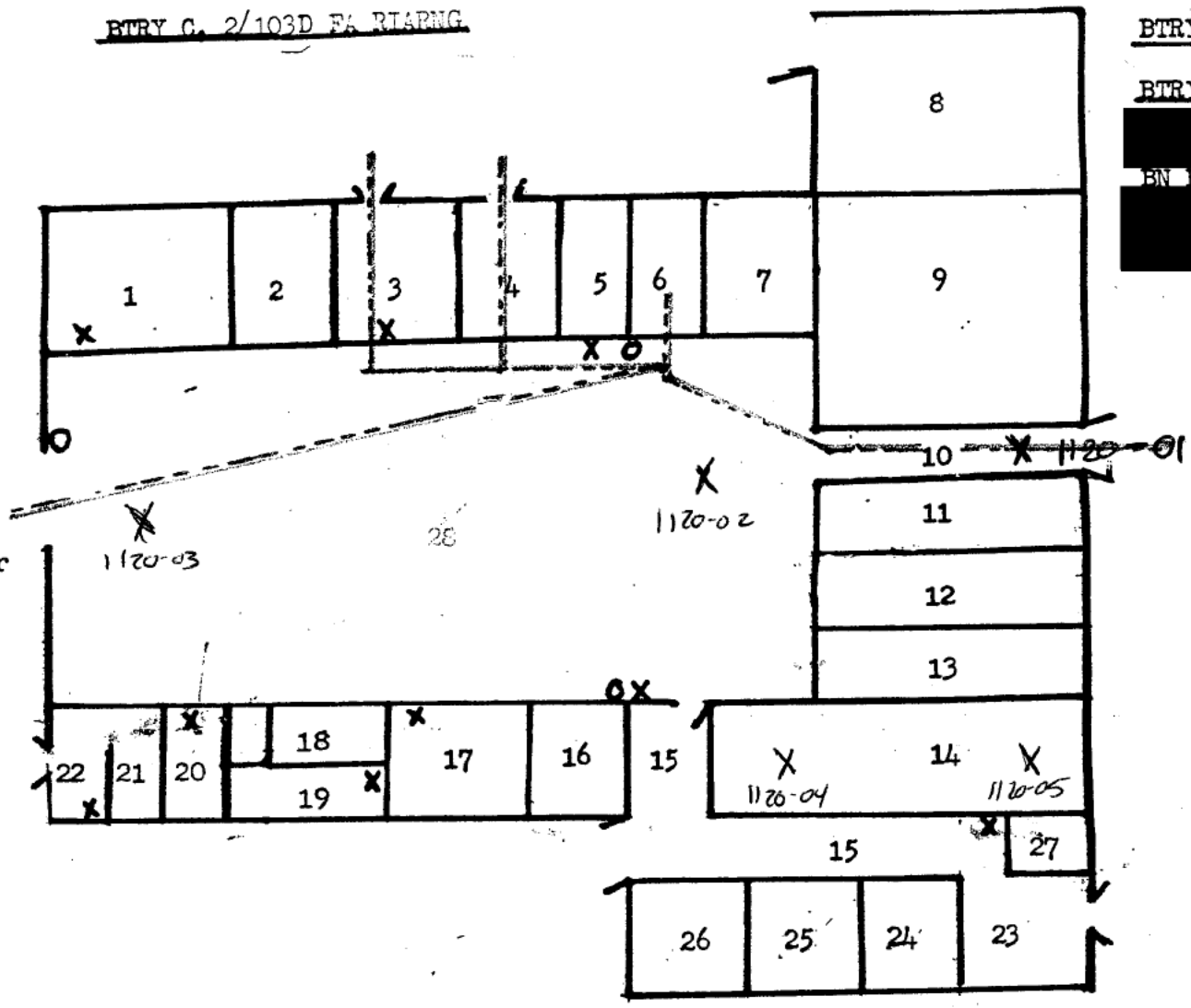
Wipe Sample Locations

BLDG FIRE PLAN

BTRY C, 2/103D FA RIARNG

You are in Room # 6

1. Supply Room
2. Arms Vault
3. Boiler Room
4. Kitchen
5. Women's Latrine
6. Officer's Latrine
7. Enlisted Latrine
8. Btry C Club Room
9. Enlisted Locker Room
10. Hallway
11. Orderly Room
12. ASG's Office
13. CO's Office
14. Rifle Range
15. Hallway/Learning Cntr
16. Mess Room
17. Custodian's Office
18. FDC Room
19. Commo Room
20. Supply Annex
21. Motor's Room
22. Motor's Room
23. Gun Room
24. Recruiter's Office
25. Training Room
26. Conference Room
27. Safe
28. Drill Floor



BTRY C, 2/103D FA RIARNG

BTRY FIRE MARSHALL [redacted] SGT

BN FIRE MARSHALL [redacted] SSG

X

BRISTOL FIRE DEPARTMENT TELEPHONE # 253-6611
BRISTOL POLICE DEPARTMENT . . . . # 253-6900

O FIRE HOSES
X FIRE EXTINGUISHERS
/ EXITS

IN CASE OF FIRE:
1. ALERT ALL OCCUPANTS
2. NOTIFY FIRE DEPT & POLICE DEPT.
3. SECURE CLASSIFIED MATERIAL IF POSSIBLE

APPENDIX B

PERSONNEL LIST

NOT PROVIDED

APPENDIX C

HAZARDOUS MATERIALS LIST

NOT PROVIDED

APPENDIX D

ANALYTICAL RESULTS

AMA Analytical Services, Inc.
A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP
NY ELAP
AIHA

Client:	URS Corporation	**Job Name:**	Army National Guard	**Chain Of Custody:**	121046
Address:	5 Industrial Way	**Job Location:**	Bristol Armory, Bristol RI	**Date Analyzed:**	12/10/2003
	Salem, New Hampshire 03079-2830	**Job Number:**	42056-013-0301	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided		

Attention: [redacted]

Summary of Phase Contrast Microscopy

AMA Sample Number	Client Sample Number	Volume Sampled (Liters)	Fibers Per Millimeter Squared		Fibers Per Cubic Centimeter	Analyst I.D.	Sample Type	Comments
0411954	1120-17	1275	23.6		0.007	GEC	AREA	
0411955	1120-18	0	< 7.0	*	*****	GEC	BLK	0 fiber(s) per 100 fields
0411956	1120-19	0	< 7.0	*	*****	GEC	BLK	0 fiber(s) per 100 fields

* The Reporting Limit for AMA Laboratory is 7.0 fibers per square millimeter of filter. The reporting limit for the air concentration of fibers (f/cc) is dependent on the sampled air volume. Fibers counts were determined by the methods described in NIOSH Analytical Method 7400, 'Fibers' (Revision 3, Issue 2, 8/15/94). All personnel samples were analyzed following the OSHA Reference Method.

[redacted]

AMA Analytical Services, Inc.
A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP
NY ELAP
AIHA

Client:	URS Corporation	**Job Name:**	Bristol Armory	**Chain Of Custody:**	121052
Address:	5 Industrial Way	**Job Location:**	Bristol, RI	**Date Analyzed:**	12/04/2003
	Salem, New Hampshire 03079-2830	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Report Date:**	08-Dec-03

Attention: [redacted]

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		Final Result		Comments
0411995	1120-01	Flame	Wipe	****	1.000	12.00	ug/ft²	< 12	ug/ft²	
0411996	1120-02	Flame	Wipe	****	1.000	12.00	ug/ft²	27	ug/ft²	
0411997	1120-03	Flame	Wipe	****	1.000	12.00	ug/ft²	38	ug/ft²	
0411998	1120-04	Flame	Wipe	****	1.000	12.00	ug/ft²	85	ug/ft²	
0411999	1120-05	Flame	Wipe	****	1.000	12.00	ug/ft²	110	ug/ft²	
0412000	1120-06	Flame	Wipe	****	1.000	12.00	ug/ft²	430	ug/ft²	
0412001	1120-07	Flame	Wipe	****	1.000	12.00	ug/ft²	5000	ug/ft²	
0412002	1120-08	Flame	Wipe	****	1.000	12.00	ug/ft²	750	ug/ft²	
0412003	1120-09	Flame	Wipe	****	1.000	12.00	ug/ft²	54	ug/ft²	
0412004	1120-10	Flame	Wipe	****	1.000	12.00	ug/ft²	96	ug/ft²	
0412005	1120-13	Flame	Wipe	****	N/A	12.00	ug	< 12	ug	

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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.

Analyst: [redacted] **Technical Manager:** [redacted]

AMA Analytical Services, Inc.
A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP
NY ELAP
AIHA

Client:	URS Corporation	**Job Name:**	Army National Guard	**Chain Of Custody:**	121046
Address:	5 Industrial Way	**Job Location:**	Bristol Armory, Bristol RI	**Date Analyzed:**	12/5/2003
	Salem, New Hampshire 03079-2830	**Job Number:**	42056-013-0301	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Report Date:**	08-Dec-03

Attention: [redacted]

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		Final Result			Comments
0411951	1120-14	Flame	Air Blank	0	N/A	3.00	ug/m³	<	3	ug	
0411952	1120-15	Flame	Air	178	N/A	16.85	ug/m³	<	17	ug/m³	
0411953	1120-16	Flame	Air	298	N/A	10.07	ug/m³	<	10	ug/m³	

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.

Analyst: [redacted]

Technical Manager: [redacted]

APPENDIX E

TRAINING CERTIFICATES

Non-Responsive

Certificate of Training

[redacted]

For successful completion of an 8 Hour, 1 Day

Asbestos Inspector & Management Planner

Annual Refresher Training

MARCH 25, 2003

This training was approved and given in accordance with Regulations for Connecticut State Agencies RCSA 20-440 - 1-9 and RCSA 20-441 and meets the requirements of the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by

Mystic Air Quality Consultants, Inc.

1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR10543

Exam Grade: 100%

Exam Date: 03/25/2003

Expiration Date: 03/25/2004

[redacted]*, CSP, RS*

[redacted]*raining Director*

BEST AVAILABLE COPY

Apr-28-03 01:42pm From-URS CORPORATION T-977 P 04/06 F-281

APPENDIX F

PHOTOGRAPHS

PHOTO LOG

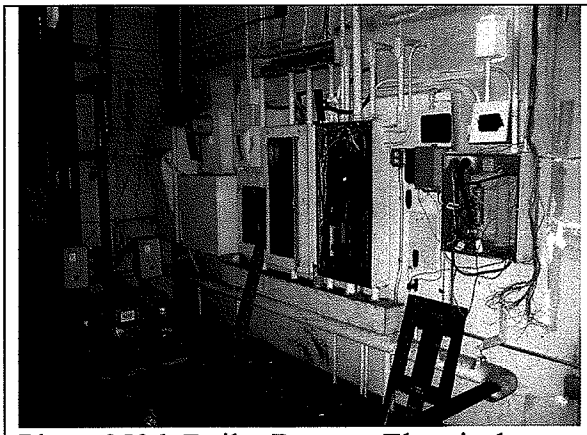


Photo 2596: Boiler Room – Electrical panel and numerous trip hazards

Photo 2597: Boiler Room – Electrical panel and numerous trip hazards

Photo 2598: Crawlspace – Asbestos-containing materials

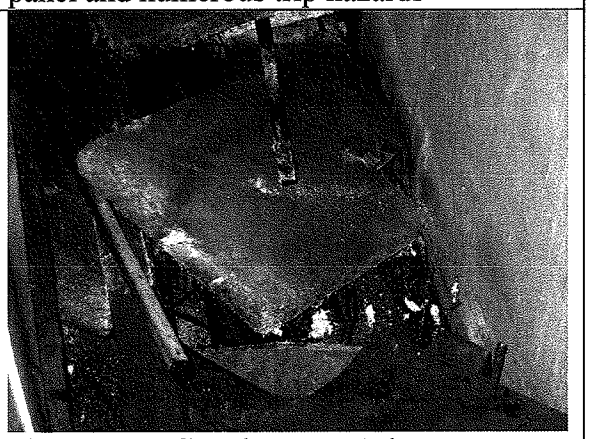


Photo 2599: Crawlspace – Asbestos-containing materials

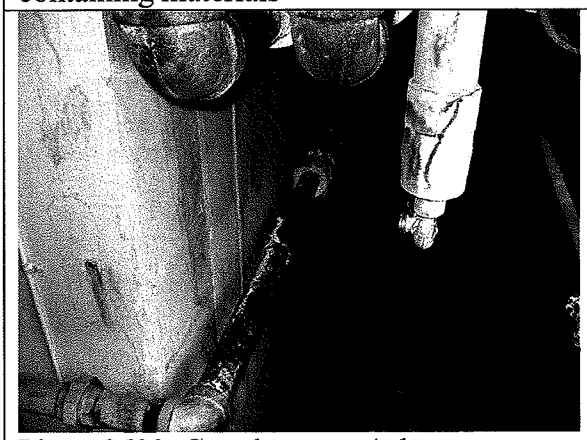


Photo 2600: Crawlspace – Asbestos-containing materials

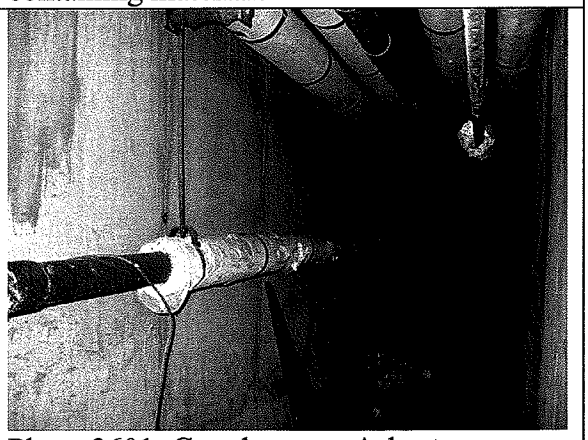


Photo 2601: Crawlspace – Asbestos-containing materials

PHOTO LOG

Photo 2602: NBC/NCO Office – Exposed asbestos-containing mastic (to be covered when Armory renovation is complete)

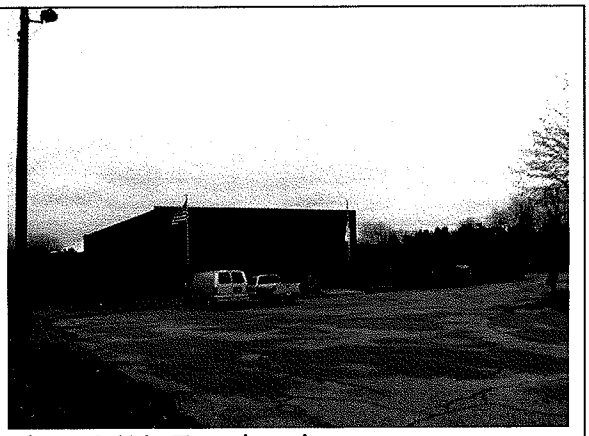


Photo 2603: Exterior view

Photo 2604: Exterior – Improperly stored asbestos-containing pipe insulation that has been removed from the building

Photo 2605: Foyer – Lead wipe sample 1120-01

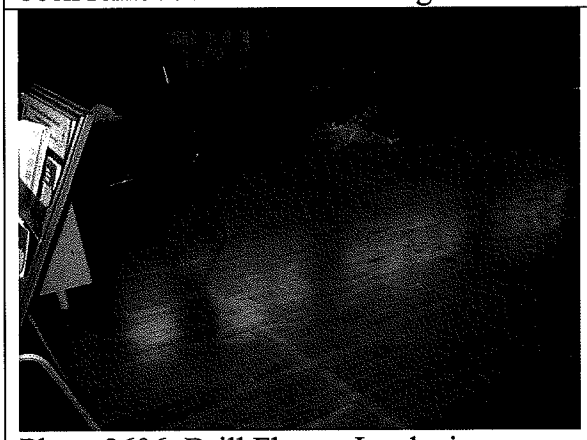


Photo 2606: Drill Floor – Lead wipe Sample 1120-02

Photo 2607: Drill Floor – Lead wipe Sample 1120-03

PHOTO LOG

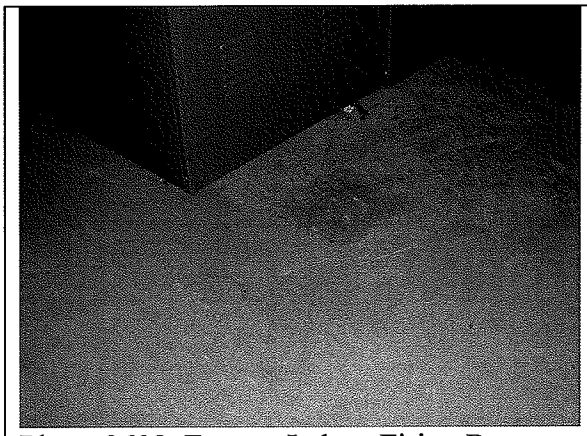


Photo 2608: Former Indoor Firing Range – Lead wipe Sample 1120-04

Photo 2609: Former Indoor Firing Range – Lead wipe Sample 1120-05

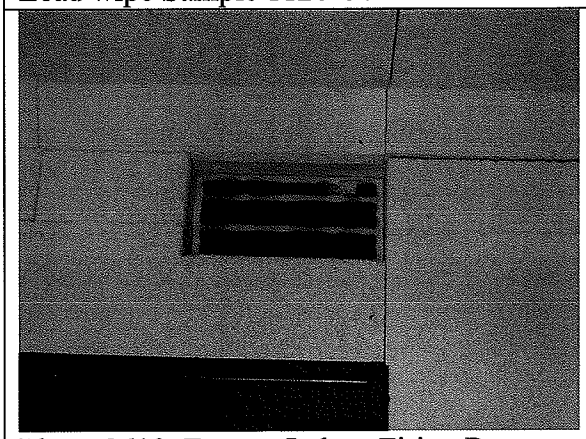


Photo 2610: Former Indoor Firing Range – Lead wipe Sample 1120-06

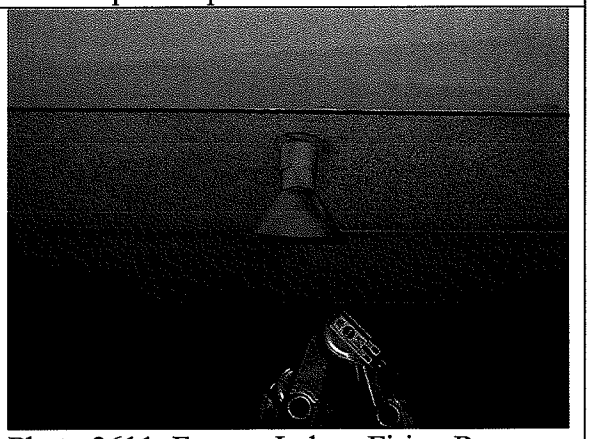


Photo 2611: Former Indoor Firing Range – Lead wipe Sample 1120-07

Photo 2612: Former Indoor Firing Range – Lead wipe Sample 1120-04

Photo 2613: Administration where asbestos-containing floor tile mastic will remain in place

PHOTO LOG

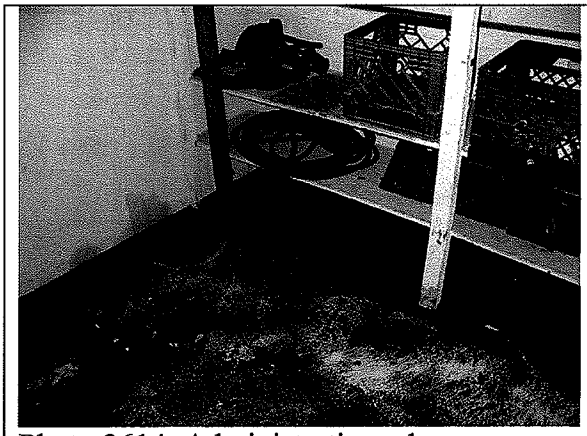


Photo 2614: Administration where asbestos-containing floor tile mastic will remain in place

Photo 2615: Administration where asbestos-containing floor tile mastic will remain in place

Photo 2616: Administration where asbestos-containing floor tile mastic will remain in place

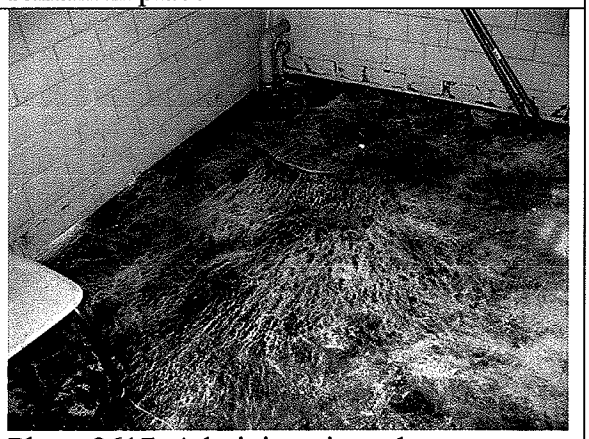


Photo 2617: Administration where asbestos-containing floor tile mastic will remain in place

APPENDIX G

RECOMMENDATIONS FOR SURFACE LEAD DUST IN ARMORIES

Subject: Recommendations for Surface Lead Dust 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 $\mu g/ft^2$) and windowsills (250 $\mu g/ft^2$) 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 $\mu g/ft^2$ 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, the US Army Center for Health Promotion and Preventive Medicine (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. 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 on individuals in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m^3 averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead dust in this building,

APPENDIX H

POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARNG INDOOR FIRING RANGES (IFR) AND GUIDELINES FOR IFR REHABILITATION, CONVERSION AND CLEANING

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

ADDENDUM

GUIDELINES FOR IFR REHABILITATION, CONVERSION, AND CLEANING

CONTENTS (Listed by paragraph number)

Purpose
1. This addendum establishes policy and procedures for rehabilitation, conversion, and cleaning of ARNG indoor firing ranges.

2. References
Related publications are listed below.
a. DODI 6055.1 (Department of Defense Instruction, Occupational Safety and Health (OSH) Program).
b. AR 11-34 (The Army Respiratory Protection Program).
c. AR 40-5 (Preventive Medicine).
d. NGR 385-15 Policy, Responsibilities, and Procedures for Inspection, Evaluation, and Operation of ARNG Indoor Firing Ranges).
e. 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards
f. OSHA Technical Manual, Edition VII.
g. DHEW NIOSH 76-130 (Lead Exposure and Design Considerations for Indoor Firing Ranges).

3. Explanation of Abbreviations and Terms
Abbreviations and special terms used in this publication are listed in the glossary.

4. Policy and Procedures
Conversion of Ranges. Indoor firing ranges can be safely rehabilitated or converted for other uses, such as a storage area, kitchen, or office space, provided the following –

a. Previously active ranges must be thoroughly decontaminated and cleaned to acceptable levels.

b. The level of cleanliness is to be determined by sampling. The Occupational Safety and Health Administration's (OSHA) Technical Manual, 5th Edition, provides guidance on the methods and techniques needed to collect wipe samples (Appendix A).

(1) Wipe samples must be collected and analyzed prior to and after cleaning.

(2) Post-cleaning surface wipe sample results must be less than or equal to 200 micrograms per square feet (ug/sq ft). The sampling strategy, which is the amount and location of wipe samples to be collected, is provided in Appendix B. Methods for interpreting the sample results are contained in Appendix C and D.

c. Equipment/Items previously stored in the range must be decontaminated and cleaned to acceptable levels.

(1) Samples must be collected from equipment/items stored in the range. Sample selection is critical, because the number of items stored and length of storage differs from range to range. The amount and location of the samples, should be representative of the areas where lead dust is most likely to accumulate. The more samples collected, the better the statistical comparison of the results.

(2) Samples must be collected from the smooth surfaces of the equipment/items, in so much as possible. Results of samples collected from a rough surface will be inaccurate due to the minimal surface contact of the media. Further, the likelihood of tearing the media filter is greater on rough surfaces.

(3) Samples should also be collected on items stored the longest period of time, and which have not been disturbed. Items stored closest to the bullet trap and firing line are likely to have higher concentrations of lead dust. Methods for interpreting the sample results are contained in Appendix C and D.

5. Goal
To ensure every indoor firing range is free of lead dust, and to reduce the number of unsafe ARNG indoor firing ranges.

6. Background
The Environmental Protection Agency (EPA) identifies lead as a highly toxic metal. Elemental lead is indestructible, and common in the environment. Lead can enter the body by inhalation (breathing) or ingestion (eating). In addition, lead is a cumulative poison. It accumulates in the blood, bones, and organs, including the kidneys, brain and liver. Effects include nervous and reproductive system disorders, delays in neurological and physical development, cognitive and behavioral changes, and hypertension. Symptoms include loss of appetite, difficulty sleeping, irritability, fatigue, headache, and inability to concentrate. It can stay in the bones for decades. Worker awareness and training are important to ensure that employees can recognize the symptoms of exposure and get prompt medical attention.

7. Wipe Sample Media

a. OSHA Technical Manual provides the necessary guidance on the technique needed to collect wipe samples (Appendix A). Only distilled or deionized water will be used to saturate dry sample media. At least one field blank filter must be submitted with each sample sheet. The field blank must be from the same lot, and labeled as a blank on the sample sheet. Appendix E identifies how and where to obtain sample media. Use the following guidance for determining media acceptability.

(1) Acceptable Media consists of –

(a) Ghost Wipes™ (**PREFERRED METHOD**)- Pre moistened

(b) Thirty-seven (37) millimeters (mm) mixed cellulose ester (MCE) filters, with or without the cassettes.

(c) Eleven (11) centimeter (cm) diameter Whatman ™ #40 paper

(2) Unacceptable Media consists of but is not limited to—
(a) Cotton balls
(b) Baby wipes or wet wipes

b. Documentation of Sample Collection. A Surface Wipe Sample Sheet must be completed and submitted with samples to your supporting laboratory. A copy of this form is located in Appendix G. Refer to Appendix A on how to collect wipe samples.

8. Wipe Sampling Protocol
See Appendix A.

9. Ranges Cleaning Instructions

a. Written procedures, such as a scope of work, or Standing Operating Procedure (SOP) that complies with all federal, state and local regulations must be established prior to decontamination operations. The range ventilation system will be in operation during range cleaning to ensure that a negative pressure environment is maintained. In the absence of mechanical ventilation system, all doors and windows will be sealed to eliminate fugitive emissions. A High Efficiency Particulate Air (HEPA) filtered vacuum system is the preferred method of cleanup followed by wet wiping of the range. The HEPA vacuum is designed to collect loose surface lead dust particles.

b. Any general purpose cleaning solution can be used. However, Spic and Span™ has been found to be an effective cleaning solution by other Army organizations. Mix new solutions of cleaning solution frequency. Wet wiping will require dual containers of water; one container for wetting the applicator (mops, rags, sponge, etc.) and the other container for rinsing the applicator after the dust has been wiped from the surfaces. When placed in containers, wastewater should be left to evaporate.

c. PROPERLY DISPOSE OF ALL HAZARDOUS WASTE. DO NOT PLACE LEAD CONTAMINATED WASTE INTO THE SEWER SYSTEM OR ONTO THE GROUND.

d. Mop-heads, sponges and rags will be discarded as hazardous waste following cleanup.

e. Wet cleaning by a high-pressure system is prohibited, as this method may embed the lead into the substratum and generate large quantities of unwanted hazardous waste.

f. Dry sweeping is not permitted.

g. All surface areas of the range must be cleaned. Do not remove the coating on smooth painted surfaces that are properly sealed.

h. Wood floors should receive a coat of deck enamel or urethane; concrete floors should be sealed with deck enamel and linoleum or tile floors should be waxed.

i. A progression of cleaning from top to bottom and from behind the steel backstop to the firing line should be used. After removing the sand, if applicable, and the steel backstop, areas in front of and behind the bullet trap along with the steel backstop plate(s) should be cleaned. Next, clean the ceiling, lights, baffles, retrieval system, heating system(s), and ventilation duct(s). Acoustical material should be vacuumed and removed rather than painted over.

j. A Toxic Characteristic Leaching Procedures (TCLP) test for lead only may need to be performed on the acoustical material. A TCLP test will determine if the material is classified as "hazardous" and can be disposed of in a sanitary landfill. Contact your State Environmental Office for assistance before arranging for this laboratory testing. The floor should be the last surface cleaned, starting at the bullet trap and ending behind the firing line.

k. After wet wiping all surfaces, permit the area to dry. Vacuum all surface areas until no dust or residue can be seen using the HEPA.

l. A thorough visual inspection to detect dust should be made following cleanup and prior to collecting post surface wipe samples.

m. As a variety of conditions exist in ranges, unique situation may arise and specific written guidance from your Regional Industrial Hygiene Office may be required.

10. Cleaning Stored Contaminated Equipment

a. Equipment contaminated (sample result is higher than 200 micrograms/sq ft) with lead dust must be decontaminated before it is removed from the range.

b. Equipment located near the bullet trap and firing line should be cleaned first and then removed. The cleaning method depends on the size of the equipment and the material it is comprised of, i.e. metal, wood, concrete, porus, non-porus, smooth or rough finish etc. However, either HEPA vacuum or the wet wipe method will be used. Refer to paragraph 9 for additional guidance.

c. Every attempt should be made to clean and reclaim items since disposing of equipment, as hazardous waste is costly and wasteful. Only as a last resort will the item be discarded as hazardous waste. Porous items, such as office partitions and carpet that were present during firing should be considered grossly contaminated and be discarded unless analysis proves otherwise. Consult your State Environmental Office for the proper hazardous waste disposal methods.

11. Contaminated Sand and Lead Waste
Consult your State Environmental Office for specific disposal guidance to ensure compliance with local laws and regulations.

12. Medical Surveillance

a. A pre-placement medical examination is required for all individuals involved with range cleanup operations. Consult 29 CFR 1910.1025 for additional information on medical surveillance requirements. A medical examination must include—

(1) A detailed work and medical history
(2) A thorough physical examination
(3) A respirator use evaluation
(4) A blood pressure measurement
(5) Blood sample analysis to include:
  (a) A baseline blood lead level
  (b) A complete blood count (CBC)
  (c) Blood urea nitrogen (BUN)
(6) Serum creatinine
(7) Zinc protoporphyrin
(8) A routine urine analysis
(9) Recordkeeping

b. Air Monitoring. Worker breathing zone (BZ) air samples must be collected to ensure personnel are not overexposed to airborne lead during the cleanup phase. Representative air samples will be collected on all personnel involved in the cleanup operation. These exposure levels will be used to evaluate work practices and personal protective equipment. Within five (5) working days after receipt of monitoring results, each employee will be notified in writing of the air sampling results. Contact your Regional Industrial Hygiene Office for additional information pertaining to air sampling.

13. Worker Education
OSHA 29 CFR 1910.1025 requires that workers who are potentially exposed to any lead level shall be informed of the content of Appendix A and B of this standard. A training program must be instituted for all individuals who are subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritations exists. The training program shall be repeated for personnel currently involved in range cleanup operations, at least annually, this training must be documented on DD Form 1556 or DD Form 1556-1 and filed permanently in the employee's Official Personnel File (OPF) or the soldier's Official Military Personnel File (OMPF). As a minimum, complete blocks 1, 2, 3, 7, 8, 11, 12, 13, 17, 18, 24, 33 and 36 of DD Form 1556. Place the following statement in block 18, "Do not destroy, retain this record for the duration of employment/service plus 30 years." The employer will assure that each employee is informed of the following:

a. The content of the standard and its appendices.
b. The specific nature of operations that could result in exposure to lead above the action level.
c. The purpose, proper selection, fitting, use and limitations of respirators.
d. The purpose and a description of medical surveillance program.
e. Eating and drinking are prohibited in lead contaminated areas.
f. Smoking and smoking materials will not be permitted in contaminated areas.

g. Employees must wash their hands and other exposed skin whenever they leave the work area.
h. The engineering controls and work practices associated with the individual's job assignment.
i. The contents of any compliance plan in effect.

14. Personal Protective Equipment
For housekeeping and rehabilitation the employer shall select respirators from among those approved for protection against lead dust, fume, and mist by the National Institute for Occupational Safety and Health (NIOSH). The employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134. As a minimum, personnel conducting the decontamination of the range will be provided with the following personal protective equipment.

a. Employees engaged in range rehabilitation and/or range conversion, the employer shall provide at no cost to the employee, and assure that the employee uses appropriate protective work clothing and equipment such as, but not limited to:

(1) Protective coveralls with hood and shoe covers or disposable Tyvek ™ full body suit.
(2) Disposable rubber gloves; and disposable shoe coverlets (If necessary).
(3) Full-face air purifying respirator with P-100 cartridges.

b. The employer shall provide the clothing required in a clean and dry condition at least daily to employees engaged in the conversion of indoor firing ranges.

c. The employer shall provide for the cleaning, laundering, or disposal of used or contaminated protective clothing and equipment.

d. The employer shall assure that all protective clothing is removed at the completion of a work shift only in areas designated for that purpose (Change Areas or Change Rooms).

e. The employer will ensure that contaminated protective clothing that is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area that seals sufficiently enough to prevent dispersion of lead dust.

f. The employer will further inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

15. Housekeeping
This chapter applies to all active indoor ranges classified as "safe" for use. To keep the range operating properly and to keep possible hazards to a minimum, a routine housekeeping/ maintenance program is essential.

a. The employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. To this end the range will be clean at the conclusion of each firing day.

b. The range ventilation system will be in operation during all cleaning operations, to ensure a negative pressure environment is maintained.

c. Ranges will be cleaned by using the wet method or vacuuming. A HEPA (High Efficiency Particulate Air) filtered vacuum system is the preferred method of meeting this requirement. The use of compressed air to clean floors is absolutely prohibited. If the wet method is utilized the floor should be equipped with a floor drain, and collection system. When there is no collection system, the water can be allowed to slowly evaporate leaving lead deposits/sludge. The deposits/sludge can then be collected, placed in metal drums, and stored for future delivery to an authorized hazardous waste disposal site. Drums must be labeled to identify contents, in accordance with the hazardous waste program.

d. A NIOSH approved respirator (P-100) for protection against lead dust, fume, and mist will be worn at all times while cleaning.

e. When cleaning start behind the firing line forward, cleaning the floor and horizontal surfaces.

16. Maintenance
The following are the minimum maintenance requirements, which must be performed quarterly by the range custodian, or by a person designated by the facility commander.

a. Inspect the ventilation system fan for condition of belts to ensure that they are not frayed or slipping.

b. Evaluate static pressure and compare to the baseline static pressure reading. Any changes will be reported through the safety manager to the Regional Industrial Hygienist.

c. Inspect Louvers, if applicable, to ensure they are opening fully.

d. Inspect the bullet trap for pitting or other damage and for sharp edges on venetian blind type bullet traps.

e. Bullet Trap. The bullet trap will be cleaned every 480 hours of operation at a minimum, or when the trap is three quarters full.

f. The range ventilation system will be operational during all bullet trap cleaning procedures.

g. All personnel involved in cleaning of the bullet trap will wear a NIOSH approved respirator, and proper personal protective equipment.

h. All debris from the bullet trap will be collected, package and turned in, in accordance with guidance from the environmental office.

17. Range Rehabilitation.

This chapter applies to all indoor firing ranges that have been identified as candidates for rehabilitation. This chapter further provides guidance for cleaning and/or sampling that might be required prior to the start of rehabilitation.

a. The portion(s) of the range to under go rehabilitation must be sampled to determine the level of lead contamination. Wipe samples will be taken per the established sampling protocol. See Appendix A.

b. All personnel involved in range rehabilitation will wear a NIOSH approved respirator (P-100), and proper personal protective equipment as prescribed in paragraph 14 above.

c. Prior to start of rehabilitation the environmental office must be notified to determine the disposition of lead containing debris.

18. Conversion of Indoor Ranges

Prior to the start of decontamination, employers must ensure that all procedures to be used comply with Federal, State, and local regulations. To ensure that all lead contamination is removed the following procedure is established.

a. All ranges slated for conversion will be inspected and evaluated.

b. All equipment stored in the range, if applicable, prior to the start of decontamination must be sampled, decontaminated, re-sampled and removed or turned in as lead contaminated material. See paragraph 10 above.

c. All acoustical tiles and/or sound proofing material (if applicable) must be removed and turned in as lead contaminated material through the environmental office.

d. The backstop, bullet trap, target retrieval system and firing line stations must be removed and turned in as lead containing material through the environmental office.

e. Light fixtures and ventilation system grills must be removed and decontaminated.

f. Ventilation system ducts need to be decontaminated or removed and replaced.

g. The exhaust fans and/or the complete ventilation air-handling unit (if applicable) must be decontaminated or removed.

h. Cover all openings of any component previously decontaminated prior to start of interior decontamination of the firing range.

19. Deviation

Deviations from this guidance will require a written exception to policy from your Regional Industrial Hygiene Office. Questions and/or comments regarding this subject should be directed to your Regional Industrial Hygiene Office or Chief, National Guard Bureau, Attn: NGB-AVS-S, 111 South George Mason Drive, Arlington, VA 22204-1382.

APPENDIX A
GENERAL PROCEDURES FOR COLLECTING WIPE SAMPLES

A-1 If multiple samples are to be collected at the work site, prepare a rough sketch of the area(s) or room(s), which are to be wipe sampled.

A-2 A new set of clean, impervious gloves should be used for each sample to avoid contamination of the media by previous samples and to prevent contact with the substance.

A-3 (1) If using Ghost Wipes™, tear open the individually sealed package. Remove the moistened wipe. Unfold the wipe.

(2) If using a dry media such as MCE or Whatman™ filter, moisten the filter with distilled or deionized water prior to sampling.

A-4 Place a 10 cm by 10 cm template on the area to be wiped.

A-5 Apply uniform firm pressure while wiping the area inside the template.

A-6 To insure that all portions of the partitioned area are wiped, start at the outside edge and progress toward the center making progress toward the center making concentric squares decreasing in size.

A-7 After collecting a sample, fold the filter or wipe inward and place into a container and number it. Note the number at the sample location on the sketch.

A-8 At least one blank filter treated in the same fashion but without wiping, should be submitted to the laboratory.

APPENDIX B
SAMPLING STRATEGY FOR COLLECTION OF WIPE SAMPLES

B-1 Prior to cleaning the ranges, the three samples must be collected and analyzed for total lead dust on each surface, i.e., floor, ceiling, backstop, and wall to include the plenum wall, if applicable. In addition, a total of 3 samples should be collected from areas which have been least disturbed by airflow. Established walkways should be avoided.

B-2 Samples should be staggered to different areas of the range. A grid system should be utilized. Each range surface areas should be divided evenly into 3 by 3 sections. Samples should not be collected on all one section of a wall or end of the building.

APPENDIX C
INTERPRETATION OF SAMPLE RESULTS (PRIOR TO CLEANING)

C-1 200 micrograms/sq ft or LESS
If all sample results are 200-micrograms/sq ft or less, the range can be converted and/or used for any purpose.

C-2 BETWEEN 201 and 200,000 micrograms/sq ft
Range must be decontaminated. Continued with cleaning instructions listed in paragraph 9 Sample results will be used to establish a baseline.

C-3 Over 200,000 micrograms/sq ft
Your sample media may not be capable of collecting additional lead dust and results that are above 200,000 micrograms/sq ft, and should be considered suspect.

APPENDIX C (Continued)

C-4 High sample results may exist due to personnel walking or moving equipment/vehicles over the range surface causing the lead dust to be "ground" into the substratum. For examples, a maintenance activity may have oversprayed paint or spilled solvents onto the surface Regional Industrial Hygiene Office for specific guidance.

APPENDIX D

INTERPRETATION OF SAMPLE RESULTS (AFTER CLEANING)

D-1 200 micrograms/sq. ft or less
If all sample results are less than 200 micrograms/sq ft, the range can be converted and/or used for any purpose after a coat of lead-free latex paint is applied.

APPENDIX E

RECOMMENDED SAMPLE MEDIA AND CONTAINERS

E-1 The following is a list of vendors, which supply the media and containers necessary to collect air and lead surface wipe samples. The information is provided to assist in obtaining the proper media and containers. Alternative vendors are available and may be utilized, if known. Contact your Regional Industrial Hygiene Office for additional assistance or clarification.

E-2 Pre-loaded 3 piece cassette with mixed cellulose ester (MCE) filter and pad, 37 millimeter (mm), pore size 0.8 microns, breathing zone (BZ) and general area (GA) air samples.

Order From	Catalog Number
a. Millipore Corp. Ashdy Road Bedford, MA 01730 617-275-9200 800-225-1380	MAWP-037-A0
b. Gelman Sciences 600 South Wagner Rd Ann Arbor, MI 48106 313-665-0651 800-521-1520	64678 (GN-4)
c. Supelco. Inc. Supelco Park Bellefonte, PA 16823 800-247-6628 800-359-3041	2-3368M

E-3 37 mm MCE Filter with pad, no cassette included, for lead surface wipe samples.

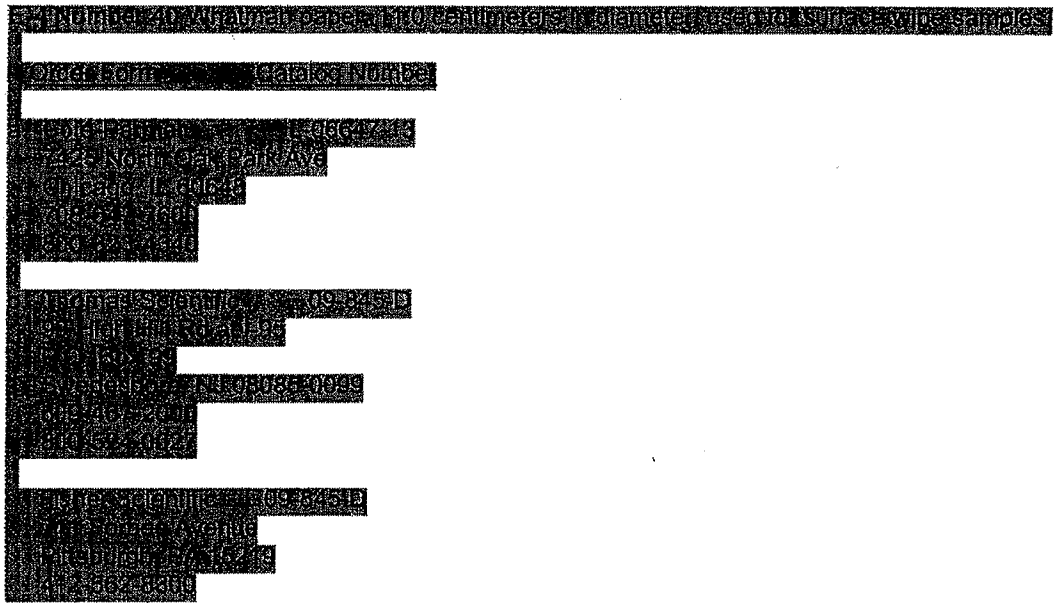
Order From	Catalog Number
a. Supelco Inc. Supelco Park Bellefonte, PA 16823	2-3381IM

APPENDIX E (Continued)

800-247-6628
800-359-3041

b. Millipore Corp. AAWP-037-00
Ashdy Road
Bedford, MA 01730
617-275-9200
800-225-1380

c. SKC, Inc. 225-5
334 Valley View Rd.
Eighty Four, PA 15330
412-941-9701
800-752-8472



E-5. Glass container (25 milliliter) for collection and shipment of media.

Order From Catalog Number

a. Pierce Chemical Co. 13219 (screw cap)
P.O. Box 117
Rockford, IL 61105
815-968-0747
800-874-3723

b. Alltech Associates, Inc. 95321 (screw cap)
Applied Science Labs
2051 Waukegan Rd.
Deerfield, IL 60015
312-948-8600

APPENDIX E (Continued)

800-255-8324

E-6. Ghost Wipes™.

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC4200

E-7. Ghost Wipe™ Containers

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC499

E-8. Plastic ziplock bags can be obtained through the Army logistics system. Many sizes are available. Contact your supporting logistics branch for assistance.

E-9. Distilled water can be purchased at larger grocery stores, usually by the gallon, at a cost of approximately $1.25. Deionized water can be obtained at local and state water labs or a hospital.

APPENDIX F
EXAMPLES OF COMPUTATION OF LEAD LEVELS FROM WIPE SAMPLE RESULTS

Sample results will be returned in the form of micrograms. The results must be converted to micrograms per square foot. This can be accomplished by following the examples listed below:

$$\frac{75 \text{ ug}}{100 \text{ cm}^2} \quad \frac{929 \text{ cm}^2}{1 \text{ sq ft}}$$

$$\frac{75 \times 929}{100} = \frac{69675}{100} = 696.75 \text{ug/sq ft}$$

ug – Microgram

Cm2 – Centimeters squared

Sq ft – Square foot

APPENDIX G
SURFACE WIPE SAMPLING SHEET

Industrial Hygiene Surface Wipe Sample Sheet			
Return Address		Point of Contact *(name & phone #)*	
		Samples Collected By	
Sampled Facility	City	State	Location *(bldg/area)*
Description of Operation		Date Collected	Date Shipped
Analysis Desired			
Sampling Data			

Lab Use Only	Sample #	Results	Remarks

Comments to Lab:

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

APPENDIX H
AIR SAMPLING SHEET

Industrial Hygiene Air Sample Sheet

Return Address		**Point of Contact** *(name/phone #)*	
		Samples Collected By	
Sampled Facility	**City**	**State**	**Location** *(bldg/area)*
Description of Operation	___ Persons Exposed	___ Hrs/Day	**Method of Collection**
Analysis Desired			
Sampling Data			

Sample No.								
Pump No.								***B***
Time On								***L***
Time Off								***A***
Total Time (min)								***N***
Flow Rate (LPM)								***K***
Volume (liters)								
GA/BZ								
Employee Name/ID								
Laboratory No.								

Calibration Information

Pump No.	Calibration (LPM)		Rotameter Setting	Date
	Pre-Use	Post-Use		

Name of Calibrator	**Calibration Date**	**Pump Manufacturer**
Comments to Lab:		

APPENDIX I
ABBREVIATIONS AND TERMS

Section I
Abbreviations

ARNG
Army National Guard

BUN
Blood urea nitrogen

BZ
Breathing zone

CBC
Complete blood count

CFR
Code of Federal Regulations

cm
Centimeter

DHEW
Department of Health, Education and Welfare

EPA
Environmental Protection Agency

GA
General area

OMPF
Official Military Personnel File

OPF
Official Personnel File

OSHA
Occupational Safety and Health Administration

TCLP
Toxic Characteristic Leaching Procedures

ug/sq ft
Micrograms per square foot

APPENDIX I (Continued)

Section II
Terms

HEPA
Refers to high efficiency particulate air filter systems capable of capturing up to 99.97 percent of particles 0.3 microns in size or larger.

Lead-Contaminated Range
It is assumed that all indoor ranges, which have been fired in, are lead-contaminated.

Wipe Sample
The terms wipe, swipe, or smear samples are use synonymously to describe the techniques utilized for assessing lead surface contamination.

Industrial Hygiene Report

Survey Performed by: Hofman Safety & Industrial Hygiene Consulting, Inc.
2 Pennwood Road
Lebanon, PA 17042
Phone: 717-304-8876

Facility: Bristol Armory
Building: RC – Armory
Date of Survey: 21 August 2012
Location: Bristol, RI
Address: 470 Metacom Ave
Bristol, RI 02809
Phone: 401-275-4380

Draft Report Submitted: 7 June 2013
Comments Received: 17 June 2013
Final Report Submitted: 21 June 2013

POC: SSG Non-Responsive
POC Phone: (401) 275-4385

Report submitted to:
NGB Region North IH Office
301-IH Old Bay Lane
Havre de Grace, MD 21078
Phone: 410-942-0273

State OH Officer: Major Non-Responsive
Bldg P-1 (Medical Section)
1 Minuteman Way
North Kingston, RI 02852
Phone: 401-275-4589

Table of Contents

Industrial Hygiene Report of Findings
Rhode Island Army National Guard
Bristol
Facility: Readiness Center / Armory
August 21, 2012

Executive Summary

An industrial hygiene evaluation was conducted at the Rhode Island Army National Guard Readiness Center (RC) / Armory located in Bristol, Rhode Island on August 21, 2012. The Armory in Bristol appears to be a generally well maintained and managed facility. An issue was identified with the completeness of the Material Safety Data Sheet (MSDS) file as many more chemicals were on site than represented in the file. A cross checking of all lists, including creating a list of cleaning products, should be completed and MSDSs obtained for all chemicals. Lead was identified in both wipe samples and horizontal surfaces should be wet wiped to remove this contaminant from the work environment. A paint chip sample taken from the wall in the mechanical room was negative for lead. An asbestos sample taken from pipe insulation in the mechanical room was negative for asbestos. Since the mechanical room has numerous signs warning of asbestos, further sampling and asbestos identification for particular materials is recommended along with an asbestos management plan. Asbestos signage should also be adjusted accordingly. A lighting survey was conducted and two areas of low lighting were identified. Lighting should be upgraded in the classroom and either upgrades or task lighting provided in the offices. It is recommended that two written programs be prepared: one for hazard communication and one for personal protective equipment. While a generic program is provided in a 1996 safety manual, site specific issues should be addressed including voluntary use of filtering facepiece respirators and chemical protection (gloves, safety glasses or goggles, and aprons) for chemical usage, including cleaning products. The temperature in many areas was a little high for the humidity levels. This can be addressed through the use of fans and good heat stress management, including adequate hydration (especially when performing physical work), proper light-weight clothing, and adequate rest periods. It was noted that there is a continuing issue with water intrusion along the walls of the drill floor. Other issues associated with possible erosion of the mortar between the outside bricks could be a contributing factor in the rear storage areas.

Operation Description

The Bristol Armory (Readiness Center) in Bristol, Rhode Island is a field artillery unit. The main Armory is comprised of about 19,000 square feet (ft^2) and includes a drill floor, offices, a training classroom, a locker room, a gym, latrines, a recreation room, and several storage rooms and vaults, including supplies for the guns/cannons, e.g. Howitzers. A boiler room is located on a lower level. The main drill floor is about two-stores high, with the remainder of the offices and classroom on a single story floor. It is believed the building was built in 1956. The current locker room used to house a firing range. It was reported that the firing range existed for about 20 years prior to 1992. From 1992 to 2007 it was used as a locker room. In 2008 and 2009 it was shut down and then abated in the 2009/2010 time frame. It has again been used as a locker room since 2011. In addition to the main armory building there is a large newer storage building to the rear. It is about 9600 ft^2. It is humidity controlled and can be used to store larger items such as the Howitzers, trucks, trailers and generators. Some equipment is stored for the Armory in Warren.

The unit has about 30 vehicles assigned including 5-ton and 2½-ton trucks, Humvees, trailers, generators, and the Howitzers.

There are three full-time employees with one deployed at the time of this assessment. The weekend troops (M-Day soldiers) number 77, 12 of which are deployed. Workers mostly plan for the drills and training that occurs on weekends, including supply and logistics, and driver training. Some minor vehicle maintenance may occur such as fluid and tire checks.

Chemical and Physical Agents
Personnel perform minor maintenance of vehicles including check and replenish fluids such as oil and antifreeze and wash vehicles/equipment. There are two flammable storage cabinets that include POL (petroleum, oil, and lubricants), CLP (clean, lube, protect) chemicals for weapons, degreasers, spray cleaner, and spray paint cans. A copy of the chemical lists can be found in Appendix D. Chemicals were labeled and stored in designated areas and flammable storage cabinets. A short cross-check was conducted between the chemical list and the available Material Safety Data Sheets (MSDSs.) The chemical list included at least 47 chemicals, not including the cleaning chemicals. There were only 10 MSDSs in the file folder. There was a significant amount of cleaning chemicals on this site. Many of these were stored on shelves in one of the storage areas and in the Janitor's closet. Workers at this site do their own cleaning. It is recommended that a thorough review of the listed chemicals be made along with preparing a list of all the cleaning products on site, and that MSDSs be obtained for all chemicals. Ref. 20 **(RAC 3 - Health (MSDSs)**)

Two wipe samples of 100 square centimeters were taken on the day of the assessment: one (W01) from the top of a locker in the locker room (decommissioned firing range) and a second from the top of a display cabinet on the assembly/drill floor near the kitchen. Both wipe samples were collected using Ghost-Wipe sample media and analyzed for lead by AMA Analytical Services, Inc., an American Industrial Hygiene Association Accredited laboratory. Lead was detected in concentrations exceeding the Occupational Safety & Health Administration (OSHA) and Department of Housing and Urban Development (HUD) decontamination level for both samples. This may indicate an incomplete remediation of the firing range or may indicate cross-contamination from some other source. All horizontal surfaces should be wet wiped with standard household cleaning soap/detergent. Do not use spray products. (Dry dusting/dust can introduce particulate into the work environment/breathing zone.) Appropriate Personal Protective Equipment should be utilized. (See Table A.) Until that time, workers and weekend soldiers should be reminded to practice good personal hygiene (washing hands, arms and faces) prior to eating and before leaving work. Ref. 36 **(RAC 3 – Health (Lead))**

Table A – Wipe Sampling Results

Sample No.	Location	Lead µg/ft^2
BRIS-W01	On Locker in Locker Room (Decommissioned Firing Range)	390
BRIS-W02	On Display Cabinet on Drill Floor Near Kitchen	220
BRIS-W03	Blank - Reporting Limit – per clean wipe	< 12 µg
	OSHA/HUD Decontamination Level	200

Shaded areas indicate that the Decontamination Level was exceeded

Sample Media: Ghost Wipes < = less than or equal to the number shown

µg/ft^2 = micrograms per square foot

A sample of peeling paint was collected from the block wall in the lower level Mechanical Room and analyzed for lead (Sample BRIS-P04.) (See Table B.) There was no lead detected in the paint chip. Environmental Protection Agency and HUD guidelines designate lead levels in excess of 0.5% as being leaded paint. Ref. 29

Table B – Paint Chip Sampling Results

Sample No.	Location	Lead Percent (%)
BRIS-P04	Paint from a Block wall in Basement	<0.0087
	HUD Definition of Lead Paint	0.5

A bulk sample was collected of pipe insulation in the mechanical room and analyzed for asbestos. Results can be found in Table C. The sample did not contain asbestos. It should be noted that there were numerous signs on both the door to the mechanical room and on the pipes themselves that asbestos was present. A more thorough inspection, including additional sampling, of this area should be conducted to determine if/where asbestos does exists and where it does not. An asbestos management plan should be prepared as needed and signage adjusted accordingly. See requirements in OSHA regulations at 29 CFR 1910.1001, and specifically 1910.1001 (j). Ref. 23 **(RAC 4 - Health (Asbestos Identification and Signage))**

Table C – Suspect Asbestos Bulk Sample Results

Sample No.	Location	Results % Asbestos
BRIS-B05	Pipe Insulation from Pipe in Basement	No Asbestos

Ventilation

There were no vehicle exhaust, battery charging room, welding or paint booth ventilation systems to measure in the Armory.

There was an exhaust hood over the 10-burner stove in the kitchen. Site personnel reported that food for the troops is catered and that the stove is seldom used. The exhaust measured for the hood was 2396 cubic feet per minute (CFM) which meets the 300 cfm per lineal foot air flow

requirement. (Ref. 13) Following are the results of the kitchen hood measurements (See Table D.)

Table D – Kitchen Hood Ventilation Survey Results (Medium Duty Appliances)

Location of Measurement	Lineal Feet of Hood	Air Volume (cubic feet per minute (cfm))	CFM per Lineal Foot	Standard (cfm)/Met Standard?
Stove Hood	6	2396	399	300 cfm per lineal foot / Yes

Reference: International Mechanical Code2012, from the International Code Council (ICC)

General building heating, ventilation and air conditioning (HVAC) is discussed below under Indoor Air Quality.

Noise

Full-shift noise dosimetry was not conducted since there were no activities that generate high noise levels. Workers in the supply, training and office areas did not use pneumatic tools or discharge weapons or operate vehicles or equipment that would generate excessive noise levels.

Lighting

A lighting survey of the facility was conducted and two areas were found to be insufficient for the work performed: a classroom and an office. Task lighting may be used in the office to meet this requirement. (Ref. 8 & 33) **(RAC 5 – Safety (Illumination))**. Survey results can be found in Table E. The time of day was morning, and there was natural light filtering in through the windows of some classrooms and offices. All other areas had adequate lighting for the work performed.

Table E - Lighting Survey Results

Location of Measurement	Foot Candles	Standard (Ref. 8)
Room 1022-1023	30	30
Drill Floor	95	30
Classroom	17	30
Men's Latrine	60	7
Ladies Latrine	22	7
Kitchen	52	50
Boiler Room	48	30
Storage 1016	46	30*
Storage	50	30*
Gym 1007	52	30
Office 1004	26	30
Locker Room	29	7

Ref. American National Standards Institute, Inc. / Illuminating Engineering Society of North America, RP-7-01, Lighting Industrial Facilities 2001, and RP-1-2004, Office Lighting, 2004. Shaded areas do not meet the light standard requirements. Area measurements were taken approximately 4 ½ feet from floor level; measurements taken at desks were approximately 30 inches from floor level. *Requirement for areas being used for storage: 30 FC – Active Small Items; 15 FC – Active Bulky Items; 5 FC - Inactive.

Personal Protective Equipment & Other Controls
As this is a readiness center / office setting, there is little need for Personal Protective Equipment (PPE) during normal operations. Each employee has been issued gloves, eye protection, hearing protection and head protection as part of their standard gear.

There is no eyewash and no carbon monoxide monitor at this location. Other controls, such as ventilation, are discussed in that appropriate section.

Ergonomics
Some periodic manual lifting does occur at this facility. It was noted that a pallet jack was available on the drill floor. There were few ergonomic concerns seen in other duties at the facility.

Written Programs
1. Confined Spaces (29 CFR 1910.146) – While there was a heating fuel tank to the East of the building, there did not appear to be other spaces that Guard members would need to enter. Therefore a confined space program would not appear to be required.
2. Hearing Conservation (29 CFR 1910.95 and DA PAM 40-501) – There did not appear to be any noise issues at this facility, therefore, a Hearing Conservation Program would not normally be required. Hearing protection was available on site should periodic noise issues present. (Ref. 3 & 18)
3. Respiratory Protection (29 CFR 1910.134) – There did not appear to be any air contaminants requiring use of respiratory protection. At most, filtering facepiece respirators may be used for clean-up. This would require provision of Voluntary use per OSHA regulations at 29 CFR 1910.134.
4. HAZCOM (29 CFR 1910.1200) - There is no site-specific written Hazard Communication Program available at the facility. The safety manual dated 1 January 1996 does contain a Hazard Communication Program that could be used by the Armory. A recommendation concerning lack of MSDSs sheets was listed above under "Chemical Agents." Note: A new Hazard Communication rule was published by OSHA on March 26, 2012. This rule will require re-training of all workers by December 2013, notably for the new labeling and new Safety Data Sheets (SDSs) requirements which will replace the old MSDS system. It is recommended that a site-specific hazard communication written program be prepared, including training elements, to comply with the current and new regulation. (Ref. 20) **(RAC 4– Health (Hazard Communication))**
5. PPE (29 CFR 1910.132) - A site-specific written Personal Protective Equipment (PPE) Program was not provided. However, the safety manual dated 1 January 1996 does have elements of a general program that could be used by the Armory if hazard assessments were performed. Because of the number and types of chemical usage at this facility, including cleaning agents, hazard assessments per requirements of 29 CFR 1910.132(d) should be done in order to comply with the regulations contained in 29 CFR 1910.132 - .138. The MSDSs can also be consulted for proper PPE to be used with the cleaning products. (Ref. 21) **(RAC 4 – Health (PPE))**
6. Other: There was no Brake Maintenance, Brake Pad Replacement, Brake Relining, Battery Charging, or Surface Lead Contamination programs available.

Indoor Air Quality

The indoor air quality measurements were within acceptable ranges in the Bristol Armory with the exception of the temperature. There is no air conditioning in the building except for a stand-alone unit in the main storage office. Results can be found in Table F. Comfort guidelines would indicate that at 60% relative humidity, an operative temperature in the range of 72° F to 78° F would be acceptable for most individuals. At 50% relative humidity the acceptable operative temperature range would be 76° F to 83° F. The temperature levels were at or only slightly over the upper acceptable operative comfort level for most individuals. This can be addressed through the use of fans and good heat stress management, including adequate hydration (especially when performing physical work), proper light-weight clothing, and adequate rest periods. (Ref. 34) **(RAC 5 – Health (Thermal Comfort))**

Carbon Dioxide (CO_2) concentrations were close to outside levels in most areas. All concentrations were well below the recommended maximum level of 1030 parts of chemical to million parts of air (ppm) (700 ppm greater than the outdoor background level) based on outdoor air levels of 330 ppm (Ref. 6). Carbon Monoxide (CO) was not identified during this survey.

The outside temperature was 81° F and the relative humidity was 46%. The sky was sunny.

Table F – Indoor Air Quality Survey Results

Location of Measurement	Temperature Degrees Fahrenheit °F	Relative Humidity Percent %	Carbon Dioxide ppm	Carbon Monoxide ppm
Outside 11:00 Hours	81	46	330	0
Room 1022-1023	79	59	340	0
Drill Floor (Rear Garage Door Open)	81	54	337	0
Classroom	80	59	343	0
Men's Latrine	80	57	365	0
Ladies Latrine	79	57	331	0
Kitchen	80	56	353	0
Boiler Room	80	60	367	0
Storage 1016	79	61	377	0
Storage	80	61	351	0
Gym 1007	78	60	360	0
Office 1004	78	62	391	0
Locker Room	78	61	372	0
Acceptable Maximum Guideline Levels	76 – 83 @ 50% RH 72 – 78 @ 60% RH	< 60	1030	9

References for Guideline Levels: American National Standards Institute, Inc. / American Society of Heating, Refrigerating and Air Conditioning Engineers, Standards 62.1 – 2010 and 55-2010.

Other Issue
Housekeeping – Housekeeping was in good condition in most areas.

Building Issues – This building is approximately 56 years old. It is believed the roof was replaced approximately 10 years ago. Water intrusion was noticeable in some areas, especially about mid-way up the drill floor walls, which are two stories high. It appears the leaks are concentrated between the drill floor walls and the first floor lower roof extensions. Some leakage could also be occurring through the windows. It manifested as a ring of damage and discoloration around the hall. (Photo provided in Appendix C.) It is suspected that the flashing between the lower roof and the drill floor outer walls may be compromised.

Two other areas of water damage were noted. These were in Rooms 1013 and 1015, both storage areas with block walls. In both instances a remediation of issues had been taken prior to the site visit. Walls had been scraped and treated with bleach. The walls in Room 1015 had been re-painted. In both instances the remediation appeared successful. These rooms both have Northeast exposures in the rear of the Armory. Upon inspection of the exterior surface, it appears that the mortar on the outside bricks has deteriorated, and that this may be the site of water infiltration. Without repairing the cause of the problem it is possible the issue could re-occur.

Water intrusions are problematic for mold growth. In addition to possible health effects, water intrusions are also long term maintenance and possibly structural decay issues. Typically, it will be much less costly to prevent or fix any water intrusions as they occur, rather than letting the issue fester and provide an opportunity for mold growth followed by required remediation. It is recommended that those responsible for building management within the RI guard management team conduct a thorough inspection of all water intrusions and take action to implement a quality and lasting repair and maintenance program. This recommendation applies to both the flashing issue and possible brick/mortar deterioration. (Ref. 30) **RAC 4-Health (Water Intrusions)**

Conclusion
The Armory in Bristol appears to be a generally well maintained and managed facility. An issue was identified with the completeness of the Material Safety Data Sheet (MSDS) file as many more chemicals were on site than represented in the file. A cross checking of all lists, including creating a list of cleaning products, should be completed and MSDSs obtained for all chemicals. Lead was identified in both wipe samples and horizontal surfaces should be wet wiped to remove this contaminant from the work environment. A paint chip sample taken from the wall in the mechanical room was negative for lead. An asbestos sample taken from pipe insulation in the mechanical room was negative for asbestos. Since the mechanical room has numerous signs warning of asbestos, further sampling and asbestos identification for particular materials is recommended along with an asbestos management plan. Asbestos signage should also be adjusted accordingly. A lighting survey was conducted and two areas of low lighting were identified. Lighting should be upgraded in the classroom and either upgrades or task lighting provided in the offices. It is recommended that two written programs be prepared: one for hazard communication and one for personal protective equipment. While a generic program is provided in a 1996 safety manual, site specific issues should be addressed including voluntary use of filtering facepiece respirators and chemical protection (gloves, safety glasses or goggles, and aprons) for chemical usage, including cleaning products. The temperature in many areas was a little high for the humidity levels. This can be addressed through the use of fans and good heat

stress management, including adequate hydration (especially when performing physical work), proper light-weight clothing, and adequate rest periods. It was noted that there is a continuing issue with water intrusion along the walls of the drill floor. Other issues associated with possible erosion of the mortar between the outside bricks could be a contributing factor in the rear storage areas.

Hofman Safety would like to thank SSG Non-Responsive for his help in gathering information and providing access to the Armory in order to complete this assessment.

URS

Prepared For:

National Guard Bureau
Army National Guard
Region North Industrial Hygiene Office
301 – IH Old Bay Lane
Havre De Grace, Maryland 21078

Prepared By:

URS Corporation
5 Industrial Way
Salem, Rhode Island 03079

FINAL
INDUSTRIAL HYGIENE SURVEY REPORT
WARREN ARMORY
WARREN , RHODE ISLAND

July 2006
PN: 39741509

Non-Responsive
Office Manager

Non-Responsive
Project Manager

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Section **Page**

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APPENDICES

FINDINGS AND RECOMMENDATIONS

Findings	Recommendation	Risk Assessment Code
Lighting		
On the day of the survey, the illumination in the administrative areas was found to be inadequate in most circumstances.	Increase lighting in the administrative areas. While work is in progress, the administrative area shall be lighted by at least the minimum lighting intensities (ANSI/IESNA RP-1-04)	RAC 4
Lead		
Suspect peeling lead-based paint was observed in the drill hall at the time of the inspection.	Personnel trained in accordance with the OSHA Lead Standard should stabilize peeling lead paint (OSHA 29 CFR 1910.1025 (e)(1)(i))	RAC 4
Lead was detected in wipe samples collected from the facility in amounts greater than 200 $\mu g/ft^2$	Personnel trained in accordance with the OSHA Lead Standard should clean the former firing range where lead was detected in quantities of greater than 200 micrograms per square foot (OSHA 29 CFR 1910.1025 (e)(1)(i))	RAC 3
Asbestos		
A site-specific asbestos operations and maintenance plan was not available. No warning labels in janitorial or maintenance areas.	Develop a site specific asbestos operations and maintenance plan to manage asbestos-containing materials by labeling of asbestos (OSHA 29 CFR 1910.1001 (j)(4)); employee information and training (OSHA 29 CFR 1910.1001 (j)(7)); housekeeping (OSHA 29 CFR 1910.1001 (k)); medical surveillance (OSHA 29 CFR 1910.1001 (l)(1)); record keeping (OSHA 29 CFR 1910.1001 (m)(1))	RAC 3
Hazard Communication		
A site specific hazard communication plan was not available.	Implement the site specific hazard communication plan to manage hazardous materials (OSHA 29 CFR 1910.1200(e))	RAC 4

1.0 SUMMARY

At the request of the National Guard Bureau (NGB) Region North Industrial Hygiene Office, URS Corporation (URS) conducted an industrial hygiene survey at the Warren Armory located in Warren, Rhode Island. This report includes an executive summary and a description of the site activities and findings and a list of conclusions and recommendations.

On January 8, 2004, Mr. Non-Responsive an industrial hygienist with URS, conducted a site visit to the Armory in Warren, Rhode Island. The purpose of this site visit was to conduct an industrial hygiene survey, which included the collection of air samples, bulk samples, lighting measurements, and a review of site health and safety procedures. Sergeant Manseau of the Rhode Island ARNG was Mr. Non-Responsive site contact for this survey.

This armory is a single story brick building, with an attached drill hall that is constructed primarily of brick and mortar. This facility is built on a concrete slab with a flat asphalt roof. The building was constructed in 1954 and encompasses 12,000 square feet. A layout drawing of the facility, which shows the locations where measurements were made during this survey, is contained in Appendix A.

2.0 ADMINISTRATIVE AREA

2.1 Operation Description

This building contains multiple administrative offices and conference rooms. There is no maintenance work performed at this facility. Chairs and desks were observed to be in a fixed position with armrests unable to be adjusted.

2.2 Chemical and Physical Agents Sampled

On the day of the survey, relative humidity, carbon dioxide and carbon monoxide measurements were made in the classroom, administration office, foyer, excess property cage, drill hall, boiler room, operations training and outside. These readings were all made using a TSI Q-Trak TM (Model 8551). No indoor air quality complaints were received during this survey.

2.2.1 Relative Humidity

Relative humidity on the day of the survey ranged from 17.6-30.5 % throughout the various building areas with an average of 20.7%. The average reading was below the recommended maximum level of 65% set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ANSI / ASHRAE Standard 62.1-2004).

2.2.2 Carbon Dioxide

Carbon dioxide concentrations ranged from a low of 420 to a high of 551 parts per million (ppm), with an average of 469.5 ppm. The outside reading was 336 ppm.

Carbon dioxide is a normal constituent of the atmosphere and ranges from about 250 to 450 ppm. The major source of excess carbon dioxide in the indoor environment is people. Other sources can include open-flame heaters, fermentation processes, and motor vehicles. Carbon dioxide itself is not normally a cause of indoor air quality problems because concentrations must exceed 5,000 to 10,000 ppm before health effects such as headache, drowsiness, and increased respiration are noted. Typically,

carbon dioxide is used as an indicator of the adequacy of fresh air intake. As the concentration of carbon dioxide increases, so do the background levels of other air contaminants.

ASHRAE (62.1-2004) recommends that levels of carbon dioxide be maintained below 700 ppm above background level. Given an outside level of 346 ppm on the day of the survey, the ASHRAE limit would be 1,046 ppm.

2.2.3 Carbon Monoxide

Carbon monoxide concentrations were less than 1 ppm on the day of the survey. ASHRAE recommends that average carbon monoxide concentrations not exceed 9 ppm. Typical average concentrations found in commercial buildings range from 0 to 6 ppm. The measured levels were below the ASHRAE guideline for indoor environments (62.1-2004). Carbon monoxide was measured using a TSI Q-Track (Model 8551).

Key sources of carbon monoxide within indoor environments may include internal combustion engines, motor vehicle and forklift exhaust, tobacco smoke, space heaters, and improperly adjusted oil or gas burners. Health effects from exposure to elevated concentrations of carbon monoxide may include fatigue, impairment of visual acuity, irregular heartbeat, headache, nausea, and confusion.

2.2.4 Lighting

Lighting in the administrative areas was measured using a Sper Scientific Ltd. Light Meter (Model 840020C). Table 2-1 below shows lighting measurements and the recommended lighting requirement (ANSI / IESNA RP –1-04 American National Standard Practice for Office Lighting).

Table 2-1
Lighting Measurements and Recommended Lighting Requirements

Location	Function	Measured Lighting (foot candles)	Recommended Lighting (foot candles)
Classroom	Classroom	56	50
Administration Office	Office	16	50
Foyer	Foyer	38	3

2.2.5 Lead

Wipe testing for lead was conducted in the administration area using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA Analytical Services, Inc. (AMA) is contained in Appendix D. Table 2-2 below shows the results of the lead sampling.

Table 2-2
Levels of Lead Dust Found in the Administration Area

Sample Location	URS Sample Number	Area Wiped (ft^2)	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Classroom – Rear Top of TV Cabinet	108-04	1.000	<12	200
1 SGT Office – Floor under heater	108-05	1.000	33	200
Foyer – Floor Under Table	108-06	1.000	<12	200
Mess Area B – Floor	108-15	1.000	<12	200
Blank	108-16	N/A	<12 µg	N/A

2.3 Ventilation System Evaluation

Not applicable to this operation.

2.4 Noise Measurements

Not applicable to this operation.

2.5 Personal Protective Equipment

Not applicable to this operation.

2.6 Interpretation of Results

GENERAL: In general, the administrative area was neat and orderly. The fire exits and extinguishers were marked and easily accessible.

ERGONOMICS: The ergonomic issues with the desks, chairs and monitors need to be corrected by fitting the workplace to the workers.

LIGHTING: On the day of the survey the illumination in the administrative area was inadequate in administration office. URS recommends increasing the area lighting or supplement task lighting for each workstation in the administrative areas. While work is in progress the administrative area must be lighted by at least the minimum light intensities.

3.0 FORMER INDOOR FIRING RANGE

3.1 Operation Description

This site has a former indoor firing range which is now used for storage and Operations and Training.

3.2 Chemical and Physical Agents Sampled

3.2.1 Lead

Wipe testing for lead was conducted in the former firing range using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 3-1 below shows the results of the lead sampling.

Table 3-1
Levels of Lead Dust Found in the Former Firing Range

Sample Location	URS Sample Number	Area Wiped (ft^2)	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Supply Cage Area – Top of Locker	108-07	1.000	490	200
Supply Cage Area – Floor	108-08	1.000	1100	200
Outside Excess Property Cage Area	108-09	1.000	560	200
NBC Area Top of Safe	108-10	1.000	95	200
Operations / Training - Floor	108-14	1.000	210	200
Blank	108-16	N/A	<12 µg	N/A

One air sample for lead dust was also collected in the former firing range. Table 3-2 below shows the result of this air sample.

Table 3-2
Level of Lead Found in the Air

Sample Location	URS Sample Number	Air Volume (L)	Result ($\mu g/m^3$)	OSHA's PEL ($\mu g/m^3$)
Former Firing Range	108-02	318	<9.4	50.0
Blank	108-03	N/A	<3 µg	N/A

On the day of the survey, the airborne lead dust level in the former firing range was found to be acceptable, below OSHA's permissible exposure limit (PEL) for lead (29 CFR 1910.1025(c)) of 50.0 $\mu g/m^3$ averaged over an 8-hour day. The analytical report from AMA is contained in Appendix D.

3.3 Ventilation System Evaluation

Not applicable to this operation.

3.4 Noise Measurements

Not applicable to this operation.

3.5 Personal Protective Equipment

Not applicable to this operation.

3.6 Interpretation of Results

LEAD: Four dust wipe samples collected from the former firing range floor were above 200 micrograms/ square foot. This is the maximum level recommended by the NGB Region North Industrial Hygiene Office. The U.S. Occupational Safety and Health Administration (OSHA) regulations, 29 CFR 1910.1025 and 29 CFR 1926.62 are designed to protect workers potentially exposed to elevated airborne levels of lead from lead-based paint. The NGB Region North Industrial Hygiene Office has prepared a memorandum titled "Recommendations for Surface Lead Dust in Armories" which is provided in Appendix G. This area should be cleaned by properly trained personnel. Guidelines for the cleanup and rehabilitation of former indoor firing ranges is provided in Appendix H.

4.0 DRILL HALL

4.1 Operation Description

The Warren armory has a drill hall constructed of block walls on a concrete slab. It encompasses an area of approximately 5,000 square feet. It is used for assemblies, drills and training. Roof leaks were observed in the drill hall.

4.2 Chemical and Physical Agents Sampled

4.2.1 Lead

Peeling paint was observed in the drill hall ceiling. Paint chip samples were not collected as this area was inaccessible.

Wipe testing for lead was conducted in the drill hall using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 4-1 below shows the results of the lead sampling.

Table 4-1
Levels of Lead Dust Found in the Drill Hall

Sample Location	URS Sample Number	Area Wiped	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Drill Floor – Outside Cage Area	108-11	1.000	60	200
Drill Floor – Outside Janitor's Closet	108-12	1.000	44	200
Blank	108-16	N/A	<12 µg	N/A

Sample numbers and locations can be found on the site map in Appendix A.

One air sample for lead dust was also collected in the drill hall. Table 4-2 below shows the result of this air sample.

Table 4-2
Level of Lead Found in the Air

Sample Location	URS Sample Number	Air Volume (L)	Result ($\mu g/m^3$)	OSHA's PEL ($\mu g/m^3$)
Drill Floor	108-01	350	<8.6	50.0
Blank	108-3	N/A	3 µg	N/A

On the day of the survey, the airborne lead dust level in the former firing range was found to be acceptable, below OSHA's permissible exposure limit (PEL) for lead (29 CFR 1910.1025(c)) of 50.0 $\mu g/m^3$ averaged over an 8-hour day. The analytical report from AMA is contained in Appendix D.

4.3 Ventilation System Evaluation

Not applicable to this operation.

4.4 Noise Measurements

Not applicable to this operation.

4.5 Personal Protective Equipment

Not applicable to this operation.

4.6 Interpretation of Results

LEAD: Peeling paint was observed on the ceiling of the drill hall. This peeling paint was not accessible for sampling and, given the age of the building, must be presumed to be lead-containing paint. The paint should be stabilized to prevent further deterioration and sampling should be conducted to determine lead content.

5.0 BOILER ROOM

5.1 Operation Description

The boiler room is a mechanical space constructed of cinder block walls with a concrete floor, containing a furnace and associated piping.

5.2 Chemical and Physical Agents Sampled

Wipe testing for lead was conducted in the Boiler Room using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 5-1 below shows the results of the lead sampling.

Table 5-1
Levels of Lead Dust Found in the Boiler Room

Sample Location	URS Sample Number	Area Wiped (ft^2)	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Boiler Room – Top of Boiler	108-13	1.000	44	200
Blank	108-16	N/A	<12 µg	N/A

5.3 Ventilation System Evaluation

Not applicable to this operation.

5.4 Noise Measurements

Not applicable to this operation.

5.5 Personal Protective Equipment

Not applicable to this operation.

5.6 Interpretation of Results

Not applicable to this operation.

6.0 SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

6.1 Confined Spaces

No safety program was found regarding confined spaces. No training records were found on site. A confined spaces program is not required for this site.

6.2 Hearing Conservation

No safety program was found regarding hearing conservation. No training records were found on site. A hearing conservation program is not required for this site.

6.3 Respiratory Protection

No safety program was found regarding respiratory protection. No training records were found on site. A respiratory protection program is not required for this site.

6.4 Hazard Communication

A program was not found regarding hazard communication. Training records were not found on site. A site-specific hazard communication program is required for this site and should include communication of hazards to employees, management of material safety data sheets, chemical labeling and spill protection.

6.5 Personal Protective Equipment

No safety program was found regarding personal protective equipment. No training records were found on site. A personal protective equipment program is not required for this site.

7.0 REFERENCES

American National Standards Institute

ANSI/ESNA RP-1-04: American National Standard Practice for Office Lighting

American Society of Heating Refrigerating and Air-Conditioning Engineers

ANSI/ASHRAE Standard 62.1-2004: Ventilation for Acceptable Indoor Air Quality

Department of the Army

Ergonomics Program Pamphlet 40-21 (15 August 2003)

Policy and Responsibilities for Inspection, Evaluation and Operation of Army National Guard Indoor Firing Ranges (National Guard Regulation 385-15 30 December 2002)

Department of Defense

DoD Hearing Conservation Program Standard 6055.12 April 1996

Creating an Ideal Workstation: A Step-by-Step Guide

U. S. Environmental Protection Agency

Asbestos Hazard Emergency Response Act (40 CFR Part 763)

National Emissions Standards for Hazardous Pollutants (40 CFR Part 61)

U. S. Housing and Urban Development

Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (1995, 1997)

U. S. Occupational Safety and Health Administration

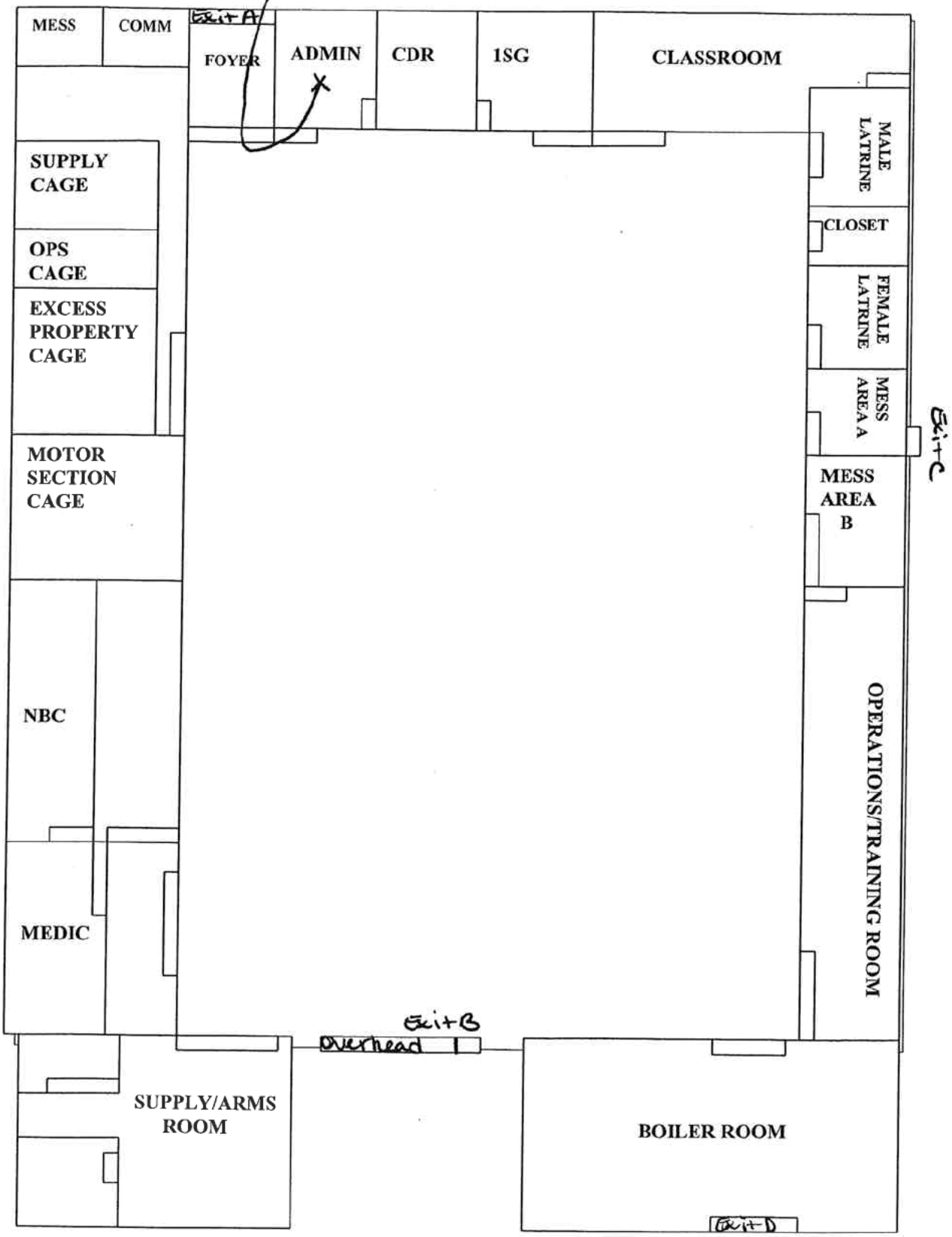
Standard for General Industry: 29 CFR 1910

APPENDIX A

ARMORY DRAWING

FIRE EVACUATION PLAN
WARREN ARMORY

WARREN POLICE DEPT:
WARREN FIRE DEPT:



APPENDIX B

PERSONNEL LIST

NOT PROVIDED

APPENDIX C

HAZARDOUS MATERIALS LIST

Warren Armory

Contents of Flammable Case

1	"Hoppes" Powder solvent
12	Gloss Blue 15102
1	Red 11136
5	Rustoleum
2	Lubricate 5-749
2	Solvent Degreaser
1	Primer Spray
1	Insulating Foam Sealant
1	Stencil Set Marking
10	Illuminating Mantle
2	Trioxane Compressed Fuel
3	"Rayovac" 7.5 volt Battery
4	Paint Rollers
2	Paint Brushes
6	Loctite (Thread loc)
1	Lock Fluid
1	Electrical Tape
7	Insect Repellant (spray)
1	Turpentine
2	Polyurethane
3	Gallons Grey
2	Gallons Tint Base
1	Gallon Prime
1	Gallon Safety Yellow
5	Gallons White
19	Insect Repellant Cream
1	1 gallon 4oz gas container
2	5 Gallon Buckets Paint

APPENDIX D

ANALYTICAL RESULTS

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	National Guard Bureau	**Job Name:**	Warren Armory	**Chain Of Custody:**	143037
Address:	301-JH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation	**Job Location:**	Warren, RI	**Date Submitted:**	8/25/2005
	Havre de Grace, Maryland 21078	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Date Analyzed:**	9/12/2005

Report Date: 12-Sep-05

Attention: [redacted]

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft^2)	Reporting Limit		Final Result		Comments
0564226	108-04	Flame	Wipe	****	1.000	12.00	ug/ft^2	<	12	ug/ft^2
0564227	108-05	Flame	Wipe	****	1.000	12.00	ug/ft^2		33	ug/ft^2
0564228	108-06	Flame	Wipe	****	1.000	12.00	ug/ft^2	<	12	ug/ft^2
0564229	108-07	Flame	Wipe	****	1.000	12.00	ug/ft^2		490	ug/ft^2
0564230	108-08	Flame	Wipe	****	1.000	12.00	ug/ft^2		1100	ug/ft^2
0564231	108-09	Flame	Wipe	****	1.000	12.00	ug/ft^2		560	ug/ft^2
0564232	108-10	Flame	Wipe	****	1.000	12.00	ug/ft^2		95	ug/ft^2
0564233	108-11	Flame	Wipe	****	1.000	12.00	ug/ft^2		40	ug/ft^2
0564234	108-12	Flame	Wipe	****	1.000	12.00	ug/ft^2		60	ug/ft^2
0564235	108-13	Flame	Wipe	****	1.000	12.00	ug/ft^2		44	ug/ft^2
0564236	108-14	Flame	Wipe	****	1.000	12.00	ug/ft^2		210	ug/ft^2
0564237	108-15	Flame	Wipe	****	1.000	12.00	ug/ft^2		14	ug/ft^2
0564238	108-16	Flame	Wipe Blank	****	N/A	12.00	ug	<	12	ug
0564239	108-01	Flame	Air	350	N/A	8.57	ug/m^3	<	8.6	ug/m^3
0564240	108-02	Flame	Air	318	N/A	9.43	ug/m^3	<	9.4	ug/m^3
0564241	108-03	Flame	Air Blank	0	N/A	3.00	ug/m^3	<	3	ug

An AIHA (#8863), NVLAP (# 101143), & New York ELAP (#10920) Accredited Laboratory
4475 Forbes Blvd. • Lanham, MD 20706 • (301) 459-2640 • Toll Free (800) 346-0961 • Fax (301) 459-2643

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

NVLAP 101143-0 · NY ELAP 10920 · AIHA 100470

CERTIFICATE OF ANALYSIS

Client:	National Guard Bureau	**Job Name:**	Warren Armory	**Chain Of Custody:**	143037
Address:	301-IH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation	**Job Location:**	Warren, RI	**Date Submitted:**	8/25/2005
	Havre de Grace, Maryland 21078	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Date Analyzed:**	9/12/2005
Attention:	[redacted]			**Report Date:**	12-Sep-05

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 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

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

Analyst: [redacted] Technical Manager: [redacted]

BEST AVAILABLE COPY

BEST AVAILABLE COPY

APPENDIX E

TRAINING CERTIFICATES

Non-Responsive

Certificate of Training

Awarded to

[redacted] Non-Responsive

For successful completion of an 8 Hour, 1 Day

Asbestos Inspector & Management Planner
Annual Refresher Training

MARCH 25, 2003

This training was approved and given in accordance with Regulations for Connecticut State Agencies RCSA 20-440 - 1-9 and RCSA 20-441 and meets the requirements of the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR10543
Exam Grade: 100%
Exam Date: 03/25/2003
Expiration Date: 03/25/2004

[redacted] Non-Responsive ***CSP, RS***

[redacted] Non-Responsive ***Training Director***

APPENDIX F

PHOTOGRAPHS

Photo 0304: Former Indoor Firing Range – Supply Cage Area (wipe sample 108-07)

Photo 0305: Photo 0304: Former Indoor Firing Range – Supply Cage Area (wipe sample 108-08)

Photo 0306: Photo 0304: Former Indoor Firing Range – Outside Excess Property Cage (wipe sample 108-09)

Photo 0311: Operations / Training Area – Rear (wipe sample 108-14)

Photo 0313: Boiler Room – Floor with oil and water

Photo 0315: Drill Hall – Peeling paint (inaccessible to sampling)

APPENDIX G

RECOMMENDATIONS FOR SURFACE LEAD DUST IN ARMORIES

Subject: Recommendations for Surface Lead Dust 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 $\mu g/ft^2$) and windowsills (250 $\mu g/ft^2$) 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 $\mu g/ft^2$ 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, the US Army Center for Health Promotion and Preventive Medicine (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. 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 on individuals in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m^3 averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead dust in this building.

APPENDIX H

POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES (NATIONAL GUARD REGULATION 385-15 30 DECEMBER 2002)

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

ADDENDUM

GUIDELINES FOR IFR REHABILITATION, CONVERSION, AND CLEANING

CONTENTS (Listed by paragraph number)

Purpose
1. This addendum establishes policy and procedures for rehabilitation, conversion, and cleaning of ARNG indoor firing ranges.

2. References
Related publications are listed below.
a. DODI 6055.1 (Department of Defense Instruction, Occupational Safety and Health (OSH) Program).
b. AR 11-34 (The Army Respiratory Protection Program).
c. AR 40-5 (Preventive Medicine).
d. NGR 385-15 Policy, Responsibilities, and Procedures for Inspection, Evaluation, and Operation of ARNG Indoor Firing Ranges).
e. 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards
f. OSHA Technical Manual, Edition VII.
g. DHEW NIOSH 76-130 (Lead Exposure and Design Considerations for Indoor Firing Ranges).

3. Explanation of Abbreviations and Terms
Abbreviations and special terms used in this publication are listed in the glossary.

4. Policy and Procedures
Conversion of Ranges. Indoor firing ranges can be safely rehabilitated or converted for other uses, such as a storage area, kitchen, or office space, provided the following –

a. Previously active ranges must be thoroughly decontaminated and cleaned to acceptable levels.

b. The level of cleanliness is to be determined by sampling. The Occupational Safety and Health Administration's (OSHA) Technical Manual, 5th Edition, provides guidance on the methods and techniques needed to collect wipe samples (Appendix A).

(1) Wipe samples must be collected and analyzed prior to and after cleaning.

(2) Post-cleaning surface wipe sample results must be less than or equal to 200 micrograms per square feet (ug/sq ft). The sampling strategy, which is the amount and location of wipe samples to be collected, is provided in Appendix B. Methods for interpreting the sample results are contained in Appendix C and D.

c. Equipment/Items previously stored in the range must be decontaminated and cleaned to acceptable levels.

(1) Samples must be collected from equipment/items stored in the range. Sample selection is critical, because the number of items stored and length of storage differs from range to range. The amount and location of the samples, should be representative of the areas where lead dust is most likely to accumulate. The more samples collected, the better the statistical comparison of the results.

(2) Samples must be collected from the smooth surfaces of the equipment/items, in so much as possible. Results of samples collected from a rough surface will be inaccurate due to the minimal surface contact of the media. Further, the likelihood of tearing the media filter is greater on rough surfaces.

(3) Samples should also be collected on items stored the longest period of time, and which have not been disturbed. Items stored closest to the bullet trap and firing line are likely to have higher concentrations of lead dust. Methods for interpreting the sample results are contained in Appendix C and D.

5. Goal
To ensure every indoor firing range is free of lead dust, and to reduce the number of unsafe ARNG indoor firing ranges.

6. Background
The Environmental Protection Agency (EPA) identifies lead as a highly toxic metal. Elemental lead is indestructible, and common in the environment. Lead can enter the body by inhalation (breathing) or ingestion (eating). In addition, lead is a cumulative poison. It accumulates in the blood, bones, and organs, including the kidneys, brain and liver. Effects include nervous and reproductive system disorders, delays in neurological and physical development, cognitive and behavioral changes, and hypertension. Symptoms include loss of appetite, difficulty sleeping, irritability, fatigue, headache, and inability to concentrate. It can stay in the bones for decades. Worker awareness and training are important to ensure that employees can recognize the symptoms of exposure and get prompt medical attention.

7. Wipe Sample Media

a. OSHA Technical Manual provides the necessary guidance on the technique needed to collect wipe samples (Appendix A). Only distilled or deionized water will be used to saturate dry sample media. At least one field blank filter must be submitted with each sample sheet. The field blank must be from the same lot, and labeled as a blank on the sample sheet. Appendix E identifies how and where to obtain sample media. Use the following guidance for determining media acceptability.

(1) Acceptable Media consists of –

(a) Ghost Wipes™ (**PREFERRED METHOD**)- Pre moistened

(b) Thirty-seven (37) millimeters (mm) mixed cellulose ester (MCE) filters, with or without the cassettes.

(c) Eleven (11) centimeter (cm) diameter Whatman ™ #40 paper

(2) Unacceptable Media consists of but is not limited to—
(a) Cotton balls
(b) Baby wipes or wet wipes

b. Documentation of Sample Collection. A Surface Wipe Sample Sheet must be completed and submitted with samples to your supporting laboratory. A copy of this form is located in Appendix G. Refer to Appendix A on how to collect wipe samples.

8. Wipe Sampling Protocol
See Appendix A.

9. Ranges Cleaning Instructions

a. Written procedures, such as a scope of work, or Standing Operating Procedure (SOP) that complies with all federal, state and local regulations must be established prior to decontamination operations. The range ventilation system will be in operation during range cleaning to ensure that a negative pressure environment is maintained. In the absence of mechanical ventilation system, all doors and windows will be sealed to eliminate fugitive emissions. A High Efficiency Particulate Air (HEPA) filtered vacuum system is the preferred method of cleanup followed by wet wiping of the range. The HEPA vacuum is designed to collect loose surface lead dust particles.

b. Any general purpose cleaning solution can be used. However, Spic and Span™ has been found to be an effective cleaning solution by other Army organizations. Mix new solutions of cleaning solution frequency. Wet wiping will require dual containers of water; one container for wetting the applicator (mops, rags, sponge, etc.) and the other container for rinsing the applicator after the dust has been wiped from the surfaces. When placed in containers, wastewater should be left to evaporate.

c. PROPERLY DISPOSE OF ALL HAZARDOUS WASTE. DO NOT PLACE LEAD CONTAMINATED WASTE INTO THE SEWER SYSTEM OR ONTO THE GROUND.

d. Mop-heads, sponges and rags will be discarded as hazardous waste following cleanup.

e. Wet cleaning by a high-pressure system is prohibited, as this method may embed the lead into the substratum and generate large quantities of unwanted hazardous waste.

f. Dry sweeping is not permitted.

g. All surface areas of the range must be cleaned. Do not remove the coating on smooth painted surfaces that are properly sealed.

h. Wood floors should receive a coat of deck enamel or urethane; concrete floors should be sealed with deck enamel and linoleum or tile floors should be waxed.

i. A progression of cleaning from top to bottom and from behind the steel backstop to the firing line should be used. After removing the sand, if applicable, and the steel backstop, areas in front of and behind the bullet trap along with the steel backstop plate(s) should be cleaned. Next, clean the ceiling, lights, baffles, retrieval system, heating system(s), and ventilation duct(s). Acoustical material should be vacuumed and removed rather than painted over.

j. A Toxic Characteristic Leaching Procedures (TCLP) test for lead only may need to be performed on the acoustical material. A TCLP test will determine if the material is classified as "hazardous" and can be disposed of in a sanitary landfill. Contact your State Environmental Office for assistance before arranging for this laboratory testing. The floor should be the last surface cleaned, starting at the bullet trap and ending behind the firing line.

k. After wet wiping all surfaces, permit the area to dry. Vacuum all surface areas until no dust or residue can be seen using the HEPA.

l. A thorough visual inspection to detect dust should be made following cleanup and prior to collecting post surface wipe samples.

m. As a variety of conditions exist in ranges, unique situation may arise and specific written guidance from your Regional Industrial Hygiene Office may be required.

10. Cleaning Stored Contaminated Equipment

a. Equipment contaminated (sample result is higher than 200 micrograms/sq ft) with lead dust must be decontaminated before it is removed from the range.

b. Equipment located near the bullet trap and firing line should be cleaned first and then removed. The cleaning method depends on the size of the equipment and the material it is comprised of, i.e. metal, wood, concrete, porus, non-porus, smooth or rough finish etc. However, either HEPA vacuum or the wet wipe method will be used. Refer to paragraph 9 for additional guidance.

c. Every attempt should be made to clean and reclaim items since disposing of equipment, as hazardous waste is costly and wasteful. Only as a last resort will the item be discarded as hazardous waste. Porous items, such as office partitions and carpet that were present during firing should be considered grossly contaminated and be discarded unless analysis proves otherwise. Consult your State Environmental Office for the proper hazardous waste disposal methods.

11. Contaminated Sand and Lead Waste
Consult your State Environmental Office for specific disposal guidance to ensure compliance with local laws and regulations.

12. Medical Surveillance

a. A pre-placement medical examination is required for all individuals involved with range cleanup operations. Consult 29 CFR 1910.1025 for additional information on medical surveillance requirements. A medical examination must include—

(1) A detailed work and medical history
(2) A thorough physical examination
(3) A respirator use evaluation
(4) A blood pressure measurement
(5) Blood sample analysis to include:
  (a) A baseline blood lead level
  (b) A complete blood count (CBC)
  (c) Blood urea nitrogen (BUN)
(6) Serum creatinine
(7) Zinc protoporphyrin
(8) A routine urine analysis
(9) Recordkeeping

b. Air Monitoring. Worker breathing zone (BZ) air samples must be collected to ensure personnel are not overexposed to airborne lead during the cleanup phase. Representative air samples will be collected on all personnel involved in the cleanup operation. These exposure levels will be used to evaluate work practices and personal protective equipment. Within five (5) working days after receipt of monitoring results, each employee will be notified in writing of the air sampling results. Contact your Regional Industrial Hygiene Office for additional information pertaining to air sampling.

13. Worker Education
OSHA 29 CFR 1910.1025 requires that workers who are potentially exposed to any lead level shall be informed of the content of Appendix A and B of this standard. A training program must be instituted for all individuals who are subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritations exists. The training program shall be repeated for personnel currently involved in range cleanup operations, at least annually, this training must be documented on DD Form 1556 or DD Form 1556-1 and filed permanently in the employee's Official Personnel File (OPF) or the soldier's Official Military Personnel File (OMPF). As a minimum, complete blocks 1, 2, 3, 7, 8, 11, 12, 13, 17, 18, 24, 33 and 36 of DD Form 1556. Place the following statement in block 18, "Do not destroy, retain this record for the duration of employment/service plus 30 years." The employer will assure that each employee is informed of the following:

a. The content of the standard and its appendices.
b. The specific nature of operations that could result in exposure to lead above the action level.
c. The purpose, proper selection, fitting, use and limitations of respirators.
d. The purpose and a description of medical surveillance program.
e. Eating and drinking are prohibited in lead contaminated areas.
f. Smoking and smoking materials will not be permitted in contaminated areas.

g. Employees must wash their hands and other exposed skin whenever they leave the work area.
h. The engineering controls and work practices associated with the individual's job assignment.
i. The contents of any compliance plan in effect.

14. Personal Protective Equipment
For housekeeping and rehabilitation the employer shall select respirators from among those approved for protection against lead dust, fume, and mist by the National Institute for Occupational Safety and Health (NIOSH). The employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134. As a minimum, personnel conducting the decontamination of the range will be provided with the following personal protective equipment.

a. Employees engaged in range rehabilitation and/or range conversion, the employer shall provide at no cost to the employee, and assure that the employee uses appropriate protective work clothing and equipment such as, but not limited to:

(1) Protective coveralls with hood and shoe covers or disposable Tyvek ™ full body suit.
(2) Disposable rubber gloves; and disposable shoe coverlets (If necessary).
(3) Full-face air purifying respirator with P-100 cartridges.

b. The employer shall provide the clothing required in a clean and dry condition at least daily to employees engaged in the conversion of indoor firing ranges.

c. The employer shall provide for the cleaning, laundering, or disposal of used or contaminated protective clothing and equipment.

d. The employer shall assure that all protective clothing is removed at the completion of a work shift only in areas designated for that purpose (Change Areas or Change Rooms).

e. The employer will ensure that contaminated protective clothing that is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area that seals sufficiently enough to prevent dispersion of lead dust.

f. The employer will further inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

15. Housekeeping
This chapter applies to all active indoor ranges classified as "safe" for use. To keep the range operating properly and to keep possible hazards to a minimum, a routine housekeeping/ maintenance program is essential.

a. The employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. To this end the range will be clean at the conclusion of each firing day.

b. The range ventilation system will be in operation during all cleaning operations, to ensure a negative pressure environment is maintained.

c. Ranges will be cleaned by using the wet method or vacuuming. A HEPA (High Efficiency Particulate Air) filtered vacuum system is the preferred method of meeting this requirement. The use of compressed air to clean floors is absolutely prohibited. If the wet method is utilized the floor should be equipped with a floor drain, and collection system. When there is no collection system, the water can be allowed to slowly evaporate leaving lead deposits/sludge. The deposits/sludge can then be collected, placed in metal drums, and stored for future delivery to an authorized hazardous waste disposal site. Drums must be labeled to identify contents, in accordance with the hazardous waste program.

d. A NIOSH approved respirator (P-100) for protection against lead dust, fume, and mist will be worn at all times while cleaning.

e. When cleaning start behind the firing line forward, cleaning the floor and horizontal surfaces.

16. Maintenance
The following are the minimum maintenance requirements, which must be performed quarterly by the range custodian, or by a person designated by the facility commander.

a. Inspect the ventilation system fan for condition of belts to ensure that they are not frayed or slipping.

b. Evaluate static pressure and compare to the baseline static pressure reading. Any changes will be reported through the safety manager to the Regional Industrial Hygienist.

c. Inspect Louvers, if applicable, to ensure they are opening fully.

d. Inspect the bullet trap for pitting or other damage and for sharp edges on venetian blind type bullet traps.

e. Bullet Trap. The bullet trap will be cleaned every 480 hours of operation at a minimum, or when the trap is three quarters full.

f. The range ventilation system will be operational during all bullet trap cleaning procedures.

g. All personnel involved in cleaning of the bullet trap will wear a NIOSH approved respirator, and proper personal protective equipment.

h. All debris from the bullet trap will be collected, package and turned in, in accordance with guidance from the environmental office.

17. Range Rehabilitation.

This chapter applies to all indoor firing ranges that have been identified as candidates for rehabilitation. This chapter further provides guidance for cleaning and/or sampling that might be required prior to the start of rehabilitation.

a. The portion(s) of the range to under go rehabilitation must be sampled to determine the level of lead contamination. Wipe samples will be taken per the established sampling protocol. See Appendix A.

b. All personnel involved in range rehabilitation will wear a NIOSH approved respirator (P-100), and proper personal protective equipment as prescribed in paragraph 14 above.

c. Prior to start of rehabilitation the environmental office must be notified to determine the disposition of lead contalning debris.

18. Conversion of Indoor Ranges

Prior to the start of decontamination, employers must ensure that all procedures to be used comply with Federal, State, and local regulations. To ensure that all lead contamination is removed the following procedure is established.

a. All ranges slated for conversion will be inspected and evaluated.

b. All equipment stored in the range, if applicable, prior to the start of decontamination must be sampled, decontaminated, re-sampled and removed or turned in as lead contaminated material. See paragraph 10 above.

c. All acoustical tiles and/or sound proofing material (if applicable) must be removed and turned in as lead contaminated material through the environmental office.

d. The backstop, bullet trap, target retrieval system and firing line stations must be removed and turned in as lead containing material through the environmental office.

e. Light fixtures and ventilation system grills must be removed and decontaminated.

f. Ventilation system ducts need to be decontaminated or removed and replaced.

g. The exhaust fans and/or the complete ventilation air-handling unit (if applicable) must be decontaminated or removed.

h. Cover all openings of any component previously decontaminated prior to start of interior decontamination of the firing range.

19. Deviation

Deviations from this guidance will require a written exception to policy from your Regional Industrial Hygiene Office. Questions and/or comments regarding this subject should be directed to your Regional Industrial Hygiene Office or Chief, National Guard Bureau, Attn: NGB-AVS-S, 111 South George Mason Drive, Arlington, VA 22204-1382.

APPENDIX A
GENERAL PROCEDURES FOR COLLECTING WIPE SAMPLES

A-1 If multiple samples are to be collected at the work site, prepare a rough sketch of the area(s) or room(s), which are to be wipe sampled.

A-2 A new set of clean, impervious gloves should be used for each sample to avoid contamination of the media by previous samples and to prevent contact with the substance.

A-3 (1) If using Ghost Wipes™, tear open the individually sealed package. Remove the moistened wipe. Unfold the wipe.

(2) If using a dry media such as MCE or Whatman™ filter, moisten the filter with distilled or deionized water prior to sampling.

A-4 Place a 10 cm by 10 cm template on the area to be wiped.

A-5 Apply uniform firm pressure while wiping the area inside the template.

A-6 To insure that all portions of the partitioned area are wiped, start at the outside edge and progress toward the center making progress toward the center making concentric squares decreasing in size.

A-7 After collecting a sample, fold the filter or wipe inward and place into a container and number it. Note the number at the sample location on the sketch.

A-8 At least one blank filter treated in the same fashion but without wiping, should be submitted to the laboratory.

APPENDIX B
SAMPLING STRATEGY FOR COLLECTION OF WIPE SAMPLES

B-1 Prior to cleaning the ranges, the three samples must be collected and analyzed for total lead dust on each surface, i.e., floor, ceiling, backstop, and wall to include the plenum wall, if applicable. In addition, a total of 3 samples should be collected from areas which have been least disturbed by airflow. Established walkways should be avoided.

B-2 Samples should be staggered to different areas of the range. A grid system should be utilized. Each range surface areas should be divided evenly into 3 by 3 sections. Samples should not be collected on all one section of a wall or end of the building.

APPENDIX C
INTERPRETATION OF SAMPLE RESULTS (PRIOR TO CLEANING)

C-1 200 micrograms/sq ft or LESS
If all sample results are 200-micrograms/sq ft or less, the range can be converted and/or used for any purpose.

C-2 BETWEEN 201 and 200,000 micrograms/sq ft
Range must be decontaminated. Continued with cleaning instructions listed in paragraph 9 Sample results will be used to establish a baseline.

C-3 Over 200,000 micrograms/sq ft
Your sample media may not be capable of collecting additional lead dust and results that are above 200,000 micrograms/sq ft, and should be considered suspect.

APPENDIX C (Continued)

C-4 High sample results may exist due to personnel walking or moving equipment/vehicles over the range surface causing the lead dust to be "ground" into the substratum. For examples, a maintenance activity may have oversprayed paint or spilled solvents onto the surface Regional Industrial Hygiene Office for specific guidance.

APPENDIX D

INTERPRETATION OF SAMPLE RESULTS (AFTER CLEANING)

D-1 200 micrograms/sq. ft or less
If all sample results are less than 200 micrograms/sq ft, the range can be converted and/or used for any purpose after a coat of lead-free latex paint is applied.

APPENDIX E

RECOMMENDED SAMPLE MEDIA AND CONTAINERS

E-1 The following is a list of vendors, which supply the media and containers necessary to collect air and lead surface wipe samples. The information is provided to assist in obtaining the proper media and containers. Alternative vendors are available and may be utilized, if known. Contact your Regional Industrial Hygiene Office for additional assistance or clarification.

E-2 Pre-loaded 3 piece cassette with mixed cellulose ester (MCE) filter and pad, 37 millimeter (mm), pore size 0.8 microns, breathing zone (BZ) and general area (GA) air samples.

Order From	Catalog Number
a. Millipore Corp. Ashdy Road Bedford, MA 01730 617-275-9200 800-225-1380	MAWP-037-A0
b. Gelman Sciences 600 South Wagner Rd Ann Arbor, MI 48106 313-665-0651 800-521-1520	64678 (GN-4)
c. Supelco. Inc. Supelco Park Bellefonte, PA 16823 800-247-6628 800-359-3041	2-3368M

E-3 37 mm MCE Filter with pad, no cassette included, for lead surface wipe samples.

Order From	Catalog Number
a. Supelco Inc. Supelco Park Bellefonte, PA 16823	2-3381IM

APPENDIX E (Continued)

800-247-6628
800-359-3041

b. Millipore Corp. AAWP-037-00
Ashdy Road
Bedford, MA 01730
617-275-9200
800-225-1380

c. SKC, Inc. 225-5
334 Valley View Rd.
Eighty Four, PA 15330
412-941-9701
800-752-8472

[redacted]

E-5. Glass container (25 milliliter) for collection and shipment of media.

Order From Catalog Number

a. Pierce Chemical Co. 13219 (screw cap)
P.O. Box 117
Rockford, IL 61105
815-968-0747
800-874-3723

b. Alltech Associates, Inc. 95321 (screw cap)
Applied Science Labs
2051 Waukegan Rd.
Deerfield, IL 60015
312-948-8600

APPENDIX E (Continued)

800-255-8324

E-6. Ghost Wipes™.

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC4200

E-7. Ghost Wipe™ Containers

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC499

E-8. Plastic ziplock bags can be obtained through the Army logistics system. Many sizes are available. Contact your supporting logistics branch for assistance.

E-9. Distilled water can be purchased at larger grocery stores, usually by the gallon, at a cost of approximately $1.25. Deionized water can be obtained at local and state water labs or a hospital.

APPENDIX F
EXAMPLES OF COMPUTATION OF LEAD LEVELS FROM WIPE SAMPLE RESULTS

Sample results will be returned in the form of micrograms. The results must be converted to micrograms per square foot. This can be accomplished by following the examples listed below:

$$\frac{75 \text{ ug}}{100 \text{ cm}^2} \quad \frac{929 \text{ cm}^2}{1 \text{ sq ft}}$$

$$\frac{75 \times 929}{100} = \frac{69675}{100} = 696.75 \text{ug/sq ft}$$

ug – Microgram

Cm2 – Centimeters squared

Sq ft – Square foot

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

APPENDIX G
SURFACE WIPE SAMPLING SHEET

Industrial Hygiene Surface Wipe Sample Sheet

Return Address		Point of Contact *(name & phone #)*	
		Samples Collected By	
Sampled Facility	City	State	Location *(bldg/area)*
Description of Operation		Date Collected	Date Shipped
Analysis Desired			

Sampling Data

Lab Use Only	Sample #	Results	Remarks

Comments to Lab:

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

APPENDIX H
AIR SAMPLING SHEET

Industrial Hygiene Air Sample Sheet

Return Address		Point of Contact *(name/phone #)*	
		Samples Collected By	
Sampled Facility	City	State	Location *(bldg/area)*
Description of Operation	___ Persons Exposed	___ Hrs/Day	Method of Collection
Analysis Desired			
Sampling Data			

Sample No.								
Pump No.								B
Time On								L
Time Off								A
Total Time (min)								N
Flow Rate (LPM)								K
Volume (liters)								
GA/BZ								
Employee Name/ID								
Laboratory No.								

Calibration Information

Pump No.	Calibration (LPM)		Rotameter Setting	Date
	Pre-Use	Post-Use		

Name of Calibrator	Calibration Date	Pump Manufacturer
Comments to Lab:		

APPENDIX I
ABBREVIATIONS AND TERMS

Section I
Abbreviations

ARNG
Army National Guard

BUN
Blood urea nitrogen

BZ
Breathing zone

CBC
Complete blood count

CFR
Code of Federal Regulations

cm
Centimeter

DHEW
Department of Health, Education and Welfare

EPA
Environmental Protection Agency

GA
General area

OMPF
Official Military Personnel File

OPF
Official Personnel File

OSHA
Occupational Safety and Health Administration

TCLP
Toxic Characteristic Leaching Procedures

ug/sq ft
Micrograms per square foot

APPENDIX I (Continued)

Section II
Terms

HEPA
Refers to high efficiency particulate air filter systems capable of capturing up to 99.97 percent of particles 0.3 microns in size or larger.

Lead-Contaminated Range
It is assumed that all indoor ranges, which have been fired in, are lead-contaminated.

Wipe Sample
The terms wipe, swipe, or smear samples are use synonymously to describe the techniques utilized for assessing lead surface contamination.

NATIONAL GUARD BUREAU
ARMY NATIONAL GUARD
REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

NGB-ARS-IHNE (40-5f) 5 September 2008

EXECUTIVE SUMMARY
LEAD SURFACE WIPE SAMPLING OF
FORMER INDOOR FIRING RANGE
WARREN, RI, 07 AUGUST 2008

1. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Warren RI Armory.

2. CONCLUSION. The former IFR in the Warren Armory is contaminated with lead and needs to be cleaned prior to conversion. Efforts should be concentrated on the floors and other horizontal surfaces and the lockers should be wiped down with a damp cloth prior to removal to minimize cross-contamination.

3. RECOMMENDATIONS.

   a. Decontamination Requirements. Clean and decontaminate in accordance with guidance in NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

   b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

   c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

   d. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

   e. Additional Sampling. Collect more wipe samples once the soundproofing material is removed. (**RAC 4**) (NG Pam 420-15, reference 4)

   f. Continued Occupational Assessment. Enroll all workers involved with the conversion in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

NATIONAL GUARD BUREAU
ARMY NATIONAL GUARD
REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

LEAD SURFACE WIPE SAMPLING OF FORMER INDOOR FIRING RANGE WARREN, RI, 07 AUGUST 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Warren RI Armory.

3. BACKGOUND.

   a. General.

      (1) The Environmental Office in the State of Rhode Island initiated a project to decontaminate and convert four of their former IFRs.

      (2) The National Guard Bureau (NGB) Region North Industrial Hygiene Office was contacted to provide assistance evaluating the extent of the lead contamination in the former IFR.

      (3) The NGB Region North Industrial Hygiene Office requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

   b. Survey Personnel. This sampling project was conducted by Mr. [redacted] Industrial Hygienist, from USACHPPM-North, Fort Meade, Maryland. CPT [redacted] Occupational Health Nurse, and SGT [redacted] Occupational Health / Industrial Hygiene Technician, both with the Rhode Island Army National Guard (RI-ARNG) Occupational Health Office, and [redacted], Supervisor of Environmental Systems for the RI-ARNG, all assisted or observed during the sample collection.

4. METHODOLOGY.

a. Assessment Criteria.

(1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance with the Occupational Safety and Health Administration (OSHA) standards (reference 1).

(2) Department of the Army Pamphlet 40-503, Industrial Hygiene Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 2 and 3).

(3) National Guard Pamphlet (NG Pam) 420-15, section 1-4.b.(2) requires the results of clearance surface wipe samples to be under 200 micrograms of lead per square foot ($\mu g/ft^2$) (reference 4).

b. Methodology.

(1) Procedures. Surface wipe sampling methods were conducted in accordance with OSHA's Technical Manual, 5th edition (reference 5).

(2) Media. Ghost Wipes® were used for sample collection and were placed in 68mL HotBlock™ digestion vessels. Templates (10 cm x 10 cm) were used to ensure uniform wipe area.

(3) Lab Analysis. All samples were sent to AMA Analytical Services, Inc, and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

c. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table

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® Ghost Wipes is a registerd trademark of Environmental Express, Mt Pleasant, SC.
™ HotBlock is a trade mark of Environmental Express, Mt Pleasant, SC.

from the DODI 6055.1 (reference 1). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. Prior to this visit, a partial conversion was attempted. The bullet trap, plenum components, and firing points were removed. The baffles and soundproofing material were left in place. Caging, a divider wall, and lockers were installed in the space.

b. Wipe Sampling. Surface wipe samples were collected in accordance with the guidance provided in NG Pam 420-15. In addition, three samples were collected on the drill floor outside the former IFR. A list of sampling locations is presented in Appendix C of this report.

c. Results. Out of 23 samples collected, 10 tested positive for lead, with only 5 of the 10 above 200 $\mu g/ft^2$, and only 1 of those 5 above 1,000 $\mu g/ft^2$. Complete surface wipe sample results are provided in Appendix C of this report.

d. Lockers. Two samples were collected from a locker inside the range. One from on-top of the locker and the other from inside. The sample result from the locker top was positive for lead while the inside sample result was below detectable limits.

6. CONCLUSION. The former IFR in the Warren Armory is contaminated with lead and needs to be cleaned prior to conversion. Efforts should be concentrated on the floors and other horizontal surfaces and the lockers should be wiped down with a damp cloth prior to removal to minimize cross-contamination.

7. RECOMMENDATIONS.

g. Decontamination Requirements. Clean and decontaminate in accordance with guidance in NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

h. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during locker decontamination and the cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

i. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warren, RI, 07 August 2008

j. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

k. Additional Sampling. Collect more wipe samples once the soundproofing material is removed. (**RAC 4**) (NG Pam 420-15, reference 4)

a. Continued Occupational Assessment. Enroll all workers involved with the conversion in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive NGB Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

2. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

3. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

4. National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

5. Occupational Safety and Health Administration Technical Manual, TED 01-00-015 [TED 1-0.15A], 5th Edition.

6. Environmental Protection Agency (EPA) Method 600/R-93/200(M), Field Analysis of Lead in Paint, Bulk Dust, and Soil by Ultrasonic, Acid Digestion and Colorimetric Measurement, September 1993.

7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations (CFR), Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29 CFR Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

Taken From Table 2 of Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998. (reference 1)

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER POSSIBLE?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warren, RI, 07 August 2008

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*HHSC*
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of *Exposure*	*Exposure Duration*		
	1-8 hr/wk	>8hr/wk, not continuous	Continuous
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	*Points*
<5	1-2
5 to 9	3-4
10 to 49	5-6
>49	7-8

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warren, RI, 07 August 2008

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	IPC
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	ILLNESS PROBABILITY CODE			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

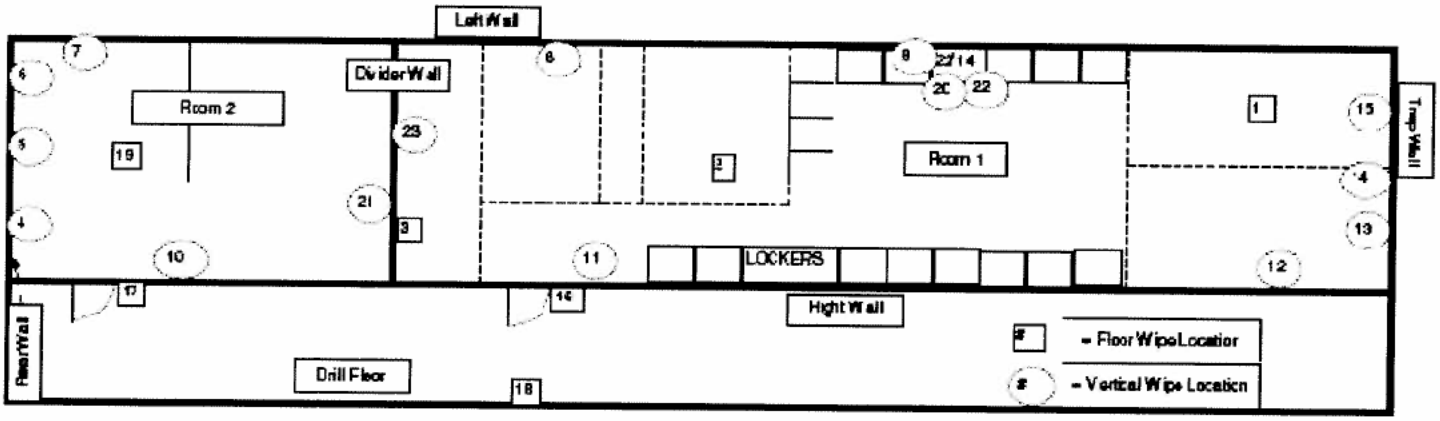
4. RAC DESCRIPTOR

RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warren, RI, 07 August 2008

APPENDIX C
SURFACE WIPE SAMPLE RESULTS: WARREN, RI

Sample	Result		Location	Rm	Distance From Wall (ft) Trap	Rear	Left	Right	Vertical Ht:	Other:
1	**830**	µg/ft²	Floor		6		6			
2	**780**	µg/ft²	Floor		42		12			
3	**480**	µg/ft²	Floor		78			3		
4	< 110	µg/ft²	Wall, Rear	2				3	0 ft	
5	< 110	µg/ft²	Wall, Rear	2				9	4 ft	on thermostat cover
6	**7700**	µg/ft²	Wall, Rear	2			1		5 ft	top of electric boxes
7	< 110	µg/ft²	Wall, Left	2		3			block below window	
8	< 110	µg/ft²	Wall, Left		66				3rd block	
9	< 110	µg/ft²	Wall, Left		27				12th block	
10	**110**	µg/ft²	Wall, Right	2		12			0 ft	
11	< 110	µg/ft²	Wall, Right		66				6th block	
12	< 110	µg/ft²	Wall, Right		3				3rd block	
13	< 110	µg/ft²	Wall, Trap					1	6 ft	
14	< 110	µg/ft²	Wall, Trap					9	3 ft	
15	< 110	µg/ft²	Wall, Trap				6		8th block	
16	**190**	µg/ft²	Floor, Drill						outside door to room 1, on right as enter range	
17	**140**	µg/ft²	Floor, Drill						outside door to room 2, on right as enter range	
18	**150**	µg/ft²	Floor, Drill						15 ft from center of door to room 1	
19	**600**	µg/ft²	Floor	2		6		9		
20	< 110	µg/ft²	Locker, Inside		27					locker number 22/14
21	< 110	µg/ft²	Wall, Divider	2				6	6 ft from floor	
22	**530**	µg/ft²	Locker, top		27					locker number 22/14
23	< 110	µg/ft²	Wall, Divider					15	3 ft from floor	



Industrial Hygiene Report

Survey Performed by: Hofman Safety & Industrial Hygiene Consulting, Inc.
2 Pennwood Road
Lebanon, PA 17042
Phone: 717-304-8876

Facility: Readiness Center / MP
Building: Readiness Center
Date of Survey: 15 August 2012
Location: Warren, RI
Address: 104 Market Street
Warren, RI 02885
Phone: 401-275-4470

Draft Report Submitted: 20 May 2013
Comments Received: 28 May 2013
Final Report Submitted: 31 May 2013

POC: Non-Responsive
POC Phone: (401) 556-2240

Report submitted to:
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Industrial Hygiene Report of Findings
Rhode Island Army National Guard
Warren
Facility: Readiness Center
August 15, 2012

Executive Summary

An industrial hygiene evaluation was conducted at the Rhode Island Army National Guard Readiness Center (RC) / located in Warren, Rhode Island on August 21, 2012. The Readiness Center in Warren is predominately an office / administration operation with few industrial hygiene-related issues. Levels of lead were sampled in the cage storage area, which previously housed a firing range, and on the drill floor food service area. Lead results showed no contamination in the old firing range area, with levels just over guideline levels found on top of the refrigerator. A written Hazard Communication Program should be prepared as well as documentation to show compliance with the Personal Protective Equipment hazard assessment and training requirements. There was evidence of a history of water intrusion that should be addressed. Standard indoor air quality parameters showed temperatures warmer than typically comfortable.

Operation Description

The Warren Readiness Center in Warren, Rhode Island houses the 169th Military Police Company. The facility includes: a drill floor, offices, a break room, classroom, storages areas, male and female latrines and showers, a weapons vault, a kitchen and a mechanical room, which is on a lower level. The building encompasses 13,704 square feet. The storage area on the East side of the building, which includes some lockers, was previously a firing range. It is believed it was converted to storage circa 2008, but this could not be confirmed. Additional lockers are located on the East side of the drill floor.

The facility normally houses five (5) full-time workers. Up to 150 soldiers drill at the facility one weekend per month. The five full-time workers typically perform activities related to maintaining the building and equipment, assuring supplies are available, and planning drills and training exercises for the monthly troops. Some minor vehicle checks are performed, with the local Facility Maintenance Shop performing vehicle maintenance functions. At the time of this assessment, all troops assigned to this facility were recently deployed. Just a few individuals from the Camp Fogarty troop command center were on hand to ready the facility for temporary closure while the soldiers are deployed. These individuals were instrumental in providing information for this assessment. The unit normally houses some equipment, including: numerous Humvees (approximately 38,) 5-ton trucks, a wrecker, water buffalo, a mobile kitchen, numerous trailers (approximately 23,) and generators. Potential exposures include: commercial cleaning products, paints, solvents, vehicle fluids, weapon cleaning / lubricating fluids, slips, trips and falls, and ergonomic hazards associated with material handling. The floor diagram can be found in Appendix B. Photographs can be found in Appendix C.

Chemical and Physical Agents

Personnel perform minor maintenance of vehicles including check and replenish fluids such as oil and antifreeze and wash vehicles/equipment. There are two flammable storage cabinets that contain items such as paint thinner, oven cleaner, starting fluid, grease off and paint. A copy of

the chemical list can be found in Appendix D. Chemicals were labeled and stored in designated areas and flammable storage cabinets. The office and administrative workers have no obvious chemical exposures.

A Quick Check surface indicator was used to identify the presence of lead in the South End of the storage cages (See Table A.) The Quick Check swab did not show a color change.

Three wipe samples of 100 square centimeters were taken on the day of the assessment: two (W-71 and W-72;) from the top of lockers in the cage storage and locker areas - North and South areas (decommissioned firing range) and (W-73) on top of a refrigerator in the food prep area of the drill floor. The wipe samples were collected using Ghost-Wipe sample media and analyzed for lead by AMA Analytical Services, Inc., an American Industrial Hygiene Association Accredited laboratory. Lead was detected in concentrations just over the Department of Housing and Urban Development (HUD) Decontamination level of 200 micrograms of lead per square foot of surface area ($\mu g/ft^2$) for the sample from the top of a refrigerator in the food prep area located near the drill floor.

Table A – Quick Check Surface Sampling Results

Location	Lead
South End of Storage Cages	ND
Color Change Detection Limit (µg)	2µg
USACHPPM Screening Level	22 $\mu g/100cm^2$

Sample Media: Quick Check Tubes – If target metal is present, the swab turns to an indicator color.
ND = none detected

Table B – Wipe Sampling Results

Sample No.	Location	Lead $\mu g/ft^2$
WRN-W-71	On Locker in Storage/Locker Room North Side (Decommissioned Firing Range)	<110
WRN-W-72	On Locker in Cage Storage Area South Side (Decommissioned Firing Range)	<110
WRN-W-73	Top of Refrigerator in Food Serving Area on Drill Floor	210
WRN-W-76	Blank - Reporting Limit – per clean wipe	< 12 µg
	OSHA/HUD Decontamination Level	200

Shaded areas indicate that the Decontamination Level was exceeded
Sample Media: Ghost Wipes < = less than or equal to the number shown
$\mu g/ft^2$ = micrograms per square foot

A sample of peeling paint was collected from the cage area ceiling and analyzed for lead. Sample WRN-B-74. (see Table C) There was no lead detected in the paint chip. Environmental Protection Agency (EPA) guidelines designate lead levels in excess of 0.5% as being leaded paint.

Table C – Paint Chip Sampling Results

Sample No.	Location	Lead Percent (%)
WRN-B-74	Paint from the Cage Area Ceiling	<0.0059
	EPA/HUD Definition of Lead Paint	0.5

All the sample data taken together would indicate minor concern over lead contamination. The HUD rules mainly apply to housing where children can ingest lead-containing dust, not adults in a work setting. The fact that the samples in the firing range area tested clean would indicate that sufficient cleaning was performed during decommissioning.

A bulk sample was collected of the cage area ceiling material. This was a very unusual shaped material resembling painted straw. Results can be found in Table D. The ceiling sample from the cage area did not contain asbestos.

Table D – Suspect Asbestos Bulk Sample Results

Sample No.	Location	Results % Asbestos
WRN-B-75	Ceiling From Cage Area	No Asbestos Detected

Ventilation
There were no vehicle exhaust, battery charging room, welding or paint booth ventilation systems to measure in the RC.

There was an exhaust hood over the 6-burner stove and griddle in the kitchen. Following are the results of the kitchen hood measurements (see Table E).

Table E – Kitchen Hood Ventilation Survey Results (Medium Duty Appliances)

Location of Measurement	Lineal Feet of Hood	Air Volume (cubic feet per minute (cfm))	CFM per Lineal Foot	Standard /Met Standard?
Stove/Griddle Hood	6	2306	385	300 cfm/lineal foot /Yes

Reference: International Mechanical Code 2012, from the International Code Council (ICC) (Ref. 13)

Noise
Full-shift noise dosimetry was not conducted since there were no activities that generate high noise levels. Workers in the supply, training and office areas did not use pneumatic tools or discharge weapons or operate vehicles or equipment that would generate excessive noise levels.

Lighting

A lighting survey of the facility was conducted and all areas had adequate lighting for the work performed. Survey results can be found in Table F. The time of day was morning, and there was natural light filtering in through the windows of some of the offices and the drill floor.

Table F - Lighting Survey Results

Location of Measurement	Foot Candles	Standard (Ref. 8)
Drill Floor – Bay Door Open	180	30
Supply Room	33	*30
Cage Area	37	*30
Commander Office	50	30
Operation Room SW Corner	31	30
Kitchen	74	50
Administration Office – (Three People)	76	30
Boiler Room Lower Level	57	30
Briefing Room NW Corner	88	30

Ref. American National Standards Institute, Inc. / Illuminating Engineering Society of North America, Lighting Industrial Facilities 2001. Area measurements were taken approximately 4 ½ feet from floor level; measurements taken at desks were approximately 30 inches from floor level. *Requirement for areas being used for storage: 30 FC – Active Small Items; 15 FC – Active Bulky Items; 5 FC - Inactive.

Personal Protective Equipment & Other Controls

This is a readiness center / office setting, and there is little need for Personal Protective Equipment (PPE.) There is some PPE available, including leather gloves, safety glasses, and ear plugs. Some general comments on PPE are addressed under "Written Programs" below. There is no eyewash at the facility.

Ergonomics

There were few ergonomic concerns seen at this facility. The predominate risk would be material handling. Material handling aids are available, such as hand trucks.

Written Programs

1. Confined Spaces (29 CFR 1910.146) – There did not appear to be any confined space issues at this facility, therefore a confined space program would not be required. The RI Guard state- issued confined space program was available.
2. Hearing Conservation (29 CFR 1910.95 and DA PAM 40-501) – There did not appear to be any noise issues at this facility, therefore, a Hearing Conservation Program would not normally be required. The RI Guard state-issued program was available.
3. Respiratory Protection (29 CFR 1910.134) – There did not appear to be any air contaminants requiring use of respiratory protection. At most, filtering facepiece respirators may be used for clean-up. This would require provision of Voluntary use per OSHA regulations at 29 CFR 1910.134. The RI Guard state-issued program was available.
4. HAZCOM (29 CFR 1910.1200) - There is no site-specific written Hazard Communication Program available at the facility. The safety standard operating procedures (SSOP) dated 20 February 2012 does not contain a Hazard Communication Program. Chemical lists and MSDSs are available as associated with the flammable storage cabinets. A full chemical vs.

MSDS audit was not conducted during this evaluation. There are commercial cleaning products on site as well as solvents, automotive fluids and paints. Note: A new Hazard Communication rule was published by OSHA on March 26, 2012. This rule will require re-training of all workers by December 2013, notably for the new labeling and new Safety Data Sheets (SDSs) requirements which will replace the old MSDS system. It is recommended that a site-specific hazard communication written program be prepared, including training elements, to comply with the existing and new regulation. (Ref. 20) **(RAC 4 – Health (Hazard Communication))**

5. PPE (29 CFR 1910.132) - A site-specific written Personal Protective Equipment (PPE) Program was not provided. The SSOP does contain a section on Job Hazard Analyses, which could be modified slightly to comply with Appendix B for OSHA regulation in Subpart I. OSHA has requirements for a hazard assessment contained in 29 CFR 1910.132(d), with requirements for usage of PPE based on hazard contained in 29 CFR 1910.133-.138. While PPE needs at this facility would appear to be minimal, the few instances of applicability should be addressed and documented, including required training. (Ref. 21) **(RAC 4 – Health (PPE))**
6. There were no Brake Maintenance, Brake Pad Replacement, Brake Relining, Battery Charging, or Surface Lead Contamination programs available, nor would any of these appear to be applicable.

Indoor Air Quality

The indoor air quality measurements for carbon dioxide, carbon monoxide and relative humidity were within acceptable ranges in the Warren RC. The temperature exceeded comfort guidelines, but not excessively so. Results can be found in Table G. Comfort guidelines would indicate that at 60% relative humidity, an operative temperature in the range of 72° F to 78° F would be acceptable for most individuals. At 50% relative humidity the acceptable operative temperature range would be 76° F to 83° F (Ref 35). The temperature levels averaged 81° F with relative humidity above 60%. (Ref. 34) **(RAC 4 – Health (Temperature Guidelines))**

Carbon Dioxide (CO_2) concentrations were close to outside levels in most areas. All concentrations were well below the recommended maximum level of 1037 parts of chemical to million parts of air (ppm) (700 ppm greater than the outdoor background level) based on outdoor air levels of 337 ppm (Ref. 6).

The outside temperature was 77° F and the relative humidity was 63%. It had rained heavily earlier in the day but the sky turned sunnier as the day progressed.

Table G – Indoor Air Quality Survey Results

Location of Measurement	Temperature Degrees Fahrenheit °F	Relative Humidity Percent %	Carbon Dioxide ppm	Carbon Monoxide ppm
Outside 09:00 Hours	77	63	337	0.1
Drill Floor – Bay Door Open	80	69	358	0
Supply Room	80	65	461	0.1
Cage Area	82	65	443	0
Commander Office	81	66	376	0
Operation Room SW Corner	82	65	368	0
Kitchen	82	64	384	0
Administration Office – (Three People)	81	59	750	0
Boiler Room Lower Level	79	78	406	0
Briefing Room NW Corner (air conditioned)	72	51	469	0
Acceptable Maximum Guideline Levels	72 – 78 @ 60% RH	≤ 60	1037	9

References for Guideline Levels: American National Standards Institute, Inc. / American Society of Heating, Refrigerating and Air Conditioning Engineers, Standards 62.1 – 2010 and 55-2010.

Other Issues

Housekeeping – Housekeeping was in good condition in most areas, especially considering the recent deployment of the 169th.

Building Issues – This building has a history of window and roof leaks. Upon arrival at the facility, pools of water (cordoned off safely with hazard tape) were noted on both the East and West floors. Several pictures of damage are presented in Appendix C. Water could be seen streaming down along the walls and obvious paint and wall damage indicated a history of problems with this building. The rear parking lot floods and water enters the lower level boiler room. Water intrusions are problematic for mold growth. In addition to possible health effects, water intrusions are also long term maintenance and possibly structural decay issues. Typically, it will be much less costly to prevent or fix any water intrusions as they occur, rather than letting the issue fester and provide an opportunity for mold growth followed by required remediation. It is recommended that those responsible for building management within the RI guard management team conduct a thorough inspection of all water intrusions and take action to implement a quality and lasting repair and maintenance program. (Ref. 30) (**RAC 3-Health (Water Intrusions))**

Conclusion

The Readiness Center in Warren is predominately an office / administration operation with few industrial hygiene-related issues. It was a privilege to work with MSG Non-Responsive. A written

Hazard Communication Program should be prepared as well as documentation to show compliance with the Personal Protective Equipment hazard assessment and training requirements. There was evidence of a history of water intrusion that should be addressed. Standard indoor air quality parameters showed temperatures warmer than typically comfortable.

URS

Prepared For:

National Guard Bureau
Army National Guard
Region North Industrial Hygiene Office
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Havre De Grace, Maryland 21078

Prepared By:

URS Corporation
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Salem, New Hampshire 03079

FINAL
INDUSTRIAL HYGIENE SURVEY REPORT
WARWICK ARMORY
WARWICK, RHODE ISLAND

March 2006
PN: 39741509

Non-Responsive
Office Manager

Non-Responsive
Project Manager

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APPENDICES

FINDINGS AND RECOMMENDATIONS

Findings	Recommendation	Risk Assessment Code
Ergonomic		
Computer workstations were observed with fixed chairs, armrests, keyboards and monitors.	Ergonomic issues with the desks and chairs should be corrected by fitting the workplace to the worker (Department of the Army Pamphlet 40-21, Chapter 4, Page 7, Section 4-3)	RAC 3
Lighting		
On the day of the survey, the illumination in the administrative area was inadequate.	Increase lighting in the administrative areas. While work is in progress, the administrative area shall be lighted by at least the minimum lighting intensities (ANSI/IESNA EM 385-1-1 (3 Nov 03))	RAC 4
Lead		
Lead was detected in wipe samples collected from the facility in amounts greater than 200 $\mu g/ft^2$	Personnel trained in accordance with the OSHA Lead Standard should clean the former firing range where lead was detected in quantities of greater than 200 micrograms per square foot (OSHA 29 CFR 1910.1025 (e)(1)(i))	RAC 4
Asbestos		
No site-specific asbestos operations and maintenance plan available.	Develop a site specific asbestos operations and maintenance plan to manage asbestos-containing materials by labeling of asbestos (OSHA 29 CFR 1910.1001 (j)(4)); employee information and training (OSHA 29 CFR 1910.1001 (j)(7)); housekeeping (OSHA 29 CFR 1910.1001 (k)); medical surveillance (OSHA 29 CFR 1910.1001 (l)(1)); record keeping (OSHA 29 CFR 1910.1001 (m)(1))	RAC 3

FINDINGS AND RECOMMENDATIONS (Cont)

Findings	Recommendation	Risk Assessment Code
Hazard Communication		
Chemical Inventory sheet did not list paints and thinners.	Label all secondary containers unless intended for immediate use (OSHA 1910.1200 (f)(4))	RAC 4
No site-specific hazard communication plan available.	Develop a site specific hazard communication plan to manage hazardous materials (OSHA 29 CFR 1910.1200 (e))	RAC 4
Mold		
Water damaged was observed throughout. Mold growth could become an issue if left unattended.	Determine and repair source of water. Replace water damaged building materials and implement a moisture management program to provide direction for future water incursions (Best management practice)	RAC 4

1.0 SUMMARY

At the request of the National Guard Bureau (NGB) Region North Industrial Hygiene Office, URS Corporation (URS) conducted an industrial hygiene survey at the Warwick Armory located in Warwick, Rhode Island. This report includes an executive summary and a description of the site activities and findings and a list of conclusions and recommendations.

On December 11, 2003 Mr Non-Responsive an industrial hygienist with URS, conducted a site visit to the Warwick Armory located at 541 Airport Road in Warwick, Rhode Island 02886. The purpose of this site visit was to conduct an industrial hygiene survey, which included the collection of air samples, bulk samples, lighting measurements, and a review of site health and safety procedures. Lieutenant Non-Responsive of the Rhode Island ARNG was Mr. Non-Responsive site contact for this survey.

This facility functions as an administrative office and drill practice as well as medical facility. The building is composed of brick and block with floor tiles, suspended ceilings, carpeting and drywall for interior finishes. This facility is built on a concrete slab. The facility was constructed in the 1950's with renovations in the 1990's. A layout drawing of the facility, which shows the locations where measurements were made during this survey, is contained in Appendix A.

2.0 ADMINISTRATIVE AREA

2.1 Operation Description

This building area contains multiple offices located throughout the building with desks and computer workstations. Computer workstations were assessed during the walkthrough for ergonomic issues. Several computer workstation chairs could not be adjusted for height, the armrests were in a fixed position and keyboards in offices could not be adjusted. Computer monitors could not be adjusted for different individuals working at the workstations. If more than one person is using that station, then proper adjustments need to be made to accommodate each person. No complaints were received by URS concerning workstations at the time of this survey.

Water stains and mold growth were observed in several hallways within the armory.

Paints and thinners were located in the flammable storage locker with hazard communication data.

2.2 Chemical and Physical Agents Sampled

On the day of the survey, relative humidity, carbon dioxide and carbon monoxide measurements were made in classroom B, room 164, hall outside 164, conference 112, drill floor east, drill floor center, boiler room, and firing range. These readings were all made using a TSI Q-Trak ™ (Model 8551). No indoor air quality complaints were received during this survey.

2.2.1 Relative Humidity

Relative humidity on the day of the survey ranged from 37-47 % throughout the various building areas with an average of 43 %. This average reading was below the recommended maximum of 65% set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ANSI / ASHRAE Standard 62.1-2004).

2.2.2 Carbon Dioxide

Carbon dioxide concentrations ranged from a low of 436 to a spike of 1075 parts per million (ppm), with an average of 687 ppm. The outside reading was 326 ppm.
Carbon dioxide is a normal constituent of the atmosphere and ranges from about 250 to 450 ppm. The major source of excess carbon dioxide in the indoor environment is people. Other sources can include open-flame heaters, fermentation processes, and motor vehicles. Carbon dioxide itself is not normally a cause of indoor air quality problems because concentrations must exceed 5,000 to 10,000 ppm before health effects such as headache, drowsiness, and increased respiration are noted. Typically, carbon dioxide is used as an indicator of the adequacy of fresh air intake. As the concentration of carbon dioxide increases, so do the background levels of other air contaminants.

ASHRAE (62.1-2004) recommends that levels of carbon dioxide be maintained below 700 ppm above the outside level. Given an outside level of 326 ppm on the day of the survey, the ASHRAE limit would be 1,026 ppm.

2.2.3 Carbon Monoxide

Carbon monoxide concentrations ranged from 0.0 to 2.0 ppm on the day of the survey. ASHRAE recommends that average carbon monoxide concentrations not exceed 9 ppm. Typical average concentrations found in commercial buildings range from 0 to 6 ppm. The measured levels were below the ASHRAE guideline for indoor environments (62.1-2004). Carbon monoxide was measured using a TSI Q-Track (Model 8551).

Key sources of carbon monoxide within indoor environments may include internal combustion engines, motor vehicle and forklift exhaust, tobacco smoke, space heaters, and improperly adjusted oil or gas burners. Health effects from exposure to elevated concentrations of carbon monoxide may include fatigue, impairment of visual acuity, irregular heartbeat, headache, nausea, and confusion.

2.2.4 Lighting

Lighting in the administrative area was measured using a Sper Scientific Ltd. Light Meter (Model 840020C). Table 2-1 below shows lighting measurements and the recommended lighting requirement (ANSI / IESNA RP –1-04 American National Standard Practice for Office Lighting).

Table 2-1
Lighting Measurements and Recommended Lighting Requirements

Location	Function	Measured Lighting Footcandles	Recommended Lighting Footcandles
Classroom B	Classroom	47.8	50
Room 164	Office	46.5	50
Hall Outside 164	Hall	25.3	20
Conference 112	Office	9.2	50
Drill Floor East	Drill Hall	6.4	20
Drill Floor Center	Drill Hall	7.3	20
Boiler Room	Boiler Room	34.5	20
Firing Range	Firing Range	27.2	30

On the day of the survey the illumination in the administrative areas was inadequate.

2.2.5 Lead

Wipe testing for lead was conducted in the administrative area using ghost wipes, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 2-2 below shows the results of the lead sampling.

Table 2-2
Levels of Lead Dust Found in the Administrative Area

Sample Location	URS Sample Number	Area Wiped (ft^2)	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Classroom B - Floor	1211-04	1.000	24	200
Hal Outside Classroom A – Floor	1211-05	1.000	<12	200

Table 2-2 (Cont)

Levels of Lead Dust Found in the Administrative Area

Sample Location	URS Sample Number	Area Wiped (ft^2)	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Room 164 – Floor	1211-06	1.000	<12	200
Hall Outside Room 157 – Top of Mailbox	1211-07	1.000	77	200
Hall Outside Room 157 – Floor	1211-08	1.000	<12	200
Room 173 – Top of Bookcase	1211-09	1.000	<12	200
Hall Outside Room 178 – Floor	1211-10	1.000	<12	200
Foyer – Floor	1211-11	1.000	<12	200
Foyer – Shelf	1211-12	1.000	<12	200
Hall Outside Room 104 – Floor	1211-13	1.000	<12	200
Hall Outside Room 104 – Top of Cabinet	1211-14	1.000	<12	200
Room 112 – Top of Heater	1211-15	1.000	<12	200
Hall Outside Room 112 – Floor	1211-16	1.000	<12	200
Hall Outside Room 112 – Top of Trophy Case	1211-17	1.000	<12	200
Room 119 – Top of Refrigerator	1211-18	1.000	<12	200
Outside Room 188 – Top of File Cabinet	1211-19	1.000	17	200
Blank	1211-27	N/A	<12 µg	N/A

Air samples for airborne lead dust were collected from Classroom B. Table 2-3 below shows the results of these air samples.

Table 2-3
Airborne Concentrations of Lead

Sample Location	URS Sample Number	Air Volume (L)	Result ($\mu g/m^3$)	Lead Action Level ($\mu g/m^3$)
Classroom B	1211-01	513	<5.8	30.0
Blank	1211-03	N/A	<3	N/A

Sample numbers and locations can be found on the site map in appendix A.

On the day of the survey, the airborne lead dust levels in Classroom B was found to be below the OSHA action level of 30.0 $\mu g/m^3$ averaged over an 8-hour day.

2.3 Ventilation System Evaluation

Not applicable to this operation.

2.4 Noise Measurements

Not applicable to this operation.

2.5 Personal Protective Equipment

Not applicable to this operation.

2.6 Interpretation of Results

GENERAL: In general, the administrative areas were clean and organized. The fire exits and extinguishers were marked and easily accessible.

ERGONOMICS: The ergonomic issues regarding desks, chairs and monitors should be corrected by fitting the workplace to the workers.

LIGHTING: On the day of the survey the illumination in the administrative area was inadequate in most offices. URS recommends increasing the area lighting or supplement task lighting for each workstation in the administrative areas. While work is in progress the administrative area must be lighted by at least the minimum light intensities.

ASBESTOS: Suspect asbestos-containing floor tile was observed to be in fair condition throughout the facility. This material should be monitored under an operations and maintenance program.

MOLD: Water stains and mold growth were observed in several hallways within the armory. Determine and repair source of water. Replace water damaged building materials and implement a moisture management program to provide direction for future water incursions

3.0 INDOOR FIRING RANGE

3.1 Operation Description

This facility currently has an indoor firing range. At the time of the inspection the area was closed. A notice posted at the entrance warned of unsafe or unhealthful working conditions due to lead contamination.

3.2 Chemical and Physical Agents Sampled

3.2.1 Lead

Wipe testing for lead was conducted in the firing range using Ghost Wipes™, which meet ASTM E 1792 standards. The analytical report from AMA Analytical Services, Inc. (AMA) is contained in Appendix D. Table 3-1 below shows the results of the lead sampling.

Table 3-1
Levels of Lead Dust Found in the Firing Range

Sample Location	URS Sample Number	Area Wiped	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Firing Range- Top of Locker at Rear	1211-23	12"x12"	92	200
Firing Range- Top of Heater	1211-24	12"x12"	3,100	200
Firing Range- Rear Floor	1211-25	12"x12"	2,100	200
Firing Range- Front Floor	1211-26	12"x12"	19,000	200
Blank	1211-27	N/A	<12	200

Sample numbers and locations can be found on the site map in Appendix A.

3.3 Ventilation System Evaluation

Not applicable to this operation.

3.4 Noise Measurements

Not applicable to this operation.

3.5 Personal Protective Equipment

Not applicable to this operation.

3.6 Interpretation of Results

LEAD: Lead dust wipe sampling was performed in this area. Three samples were found to be above the maximum allowable contamination of 200 $\mu g/ft^2$

The firing range should be cleaned by an appropriately trained technician. The NGB has prepared a memorandum titled "Recommendations for Surface Lead Dust in Armories" which is provided in Appendix G. Guidelines for the cleaning and rehabilitation of indoor firing ranges is provided in Appendix H.

4.0 DRILL HALL

4.1 Operation Description

The drill hall is approximately 5,000 square feet in size and is constructed of cinder block and a concrete slab floor. The ceiling height is approximately 25 feet. This area is currently used for assemblies and drill activities.

4.2 Chemical and Physical Agents Sampled

4.2.1 Lead

Wipe testing for lead dust was conducted in the drill hall using Ghost Wipes™, which meet ASTM E 1792 standards. The analytical report from AMA is contained in Appendix D. Table 4-1 below shows the results of the lead sampling.

Table 4-1
Levels of Lead Dust Found in the Drill Hall

Sample Location	URS Sample Number	Area Wiped	Result ($\mu g/ft^2$)	Maximum Surface Contamination Level ($\mu g/ft^2$)
Drill Floor North- Floor	1211-20	12"x12"	<12	200
Drill Floor South-Floor	1211-21	12"x12"	28	200
Blank	1211-27	N/A	<12	N/A

Sample numbers and locations can be found on the site map in Appendix A.

Air samples for lead dust were collected from the Drill Floor. Table 4-2 below shows the results of these air samples.

Table 4-2
Airborne Concentrations of Lead

Sample Location	URS Sample Number	Air Volume (L)	Result ($\mu g/m^3$)	Lead Action Level ($\mu g/m^3$)
Drill Floor Southeast	1211-02	341	<8.8	30.0
Blank	1211-03	N/A	<3	N/A

Sample numbers and locations can be found on the site map in appendix A.
On the day of the survey, the airborne lead dust levels in the drill hall was found to be below the OSHA action level of 30.0 $\mu g/m^3$ averaged over an 8-hour day.

4.2.2 Asbestos

Bulk samples were not collected because no damaged suspect asbestos-containing materials were observed

The U. S. Environmental Protection Agency (EPA) states that any material with greater than 1% asbestos must be treated as ACM (U.S. EPA, Title 40 CFR Part 763.87 (c)(2)). The analytical report from AMA Analytical Services, Inc. is contained in Appendix D.

4.3 Ventilation System Evaluation

Not applicable to this operation.

4.4 Noise Measurements

Not applicable to this operation.

4.5 Personal Protective Equipment

Not applicable to this operation.

4.6 Interpretation of Results

LEAD: Wipe samples collected from the drill hall for lead were found to be above allowable limits. This area should be cleaned by an appropriately trained technician. The NGB Region North IH Office has prepared a memorandum titled "Recommendations for Surface Lead Dust in Armories" which is provided in Appendix G.

ASBESTOS: Suspect asbestos-containing floor tile should be monitored under an approved operations and maintenance program.

5.0 BOILER ROOMS

5.1 Operation Description

The boiler room is a mechanical space constructed of cinder block walls with a concrete floor, containing a furnace and associated piping.

5.2 Chemical and Physical Agents Sampled

No chemical or physical agents were sampled in this area.

5.3 Ventilation System Evaluation

Not applicable to this operation.

5.4 Noise Measurements

Not applicable to this operation.

5.5 Personal Protective Equipment

Not applicable to this operation.

5.6 Interpretation of Results

Not applicable to this operation.

6.0 SAFETY AND INDUSTRIAL HYGIENE PROGRAMS

6.1 Confined Spaces

No safety program was found regarding confined spaces. No training records were found on site. A confined spaces program is not required for this site.

6.2 Hearing Conservation

No safety program was found regarding hearing conservation. No training records were found on site. A hearing conservation program is not required for this site.

6.3 Respiratory Protection

No safety program was found regarding respiratory protection. No training records were found on site. A respiratory protection program is not required for this site.

6.4 Hazard Communication

No program was found regarding hazard communication. No training records were found on site. A site-specific hazard communication program is required for this site and should include communication of hazards to employees, management of material safety data sheets, chemical labeling and spill protection.

6.5 Personal Protective Equipment

No safety program was found regarding personal protective equipment. No training records were found on site. A personal protective equipment program is not required for this site.

7.0 REFERENCES

American National Standards Institute

ANSI/IESNA RP-1-04: American National Standard Practice for Office Lighting

American Society of Heating Refrigerating and Air-Conditioning Engineers

ANSI/ASHRAE Standard 62.1-2004: Ventilation for Acceptable Indoor Air Quality

Department of the Army

Ergonomics Program Pamphlet 40-21 (15 August 2003)

Policy and Responsibilities For Inspection, Evaluation and Operation of Army National Guard Indoor Firing Ranges (National Guard Regulation 385-15, 30 December 2002)

Department of Defense

DoD Hearing Conservation Program Standard 6055.12 April 1996

Creating an Ideal Workstation: A Step-by-Step Guide

U. S. Environmental Protection Agency

Asbestos Hazard Emergency Response Act (40 CFR Part 763)

National Emissions Standards for Hazardous Pollutants (40 CFR Part 61)

U. S. Housing and Urban Development

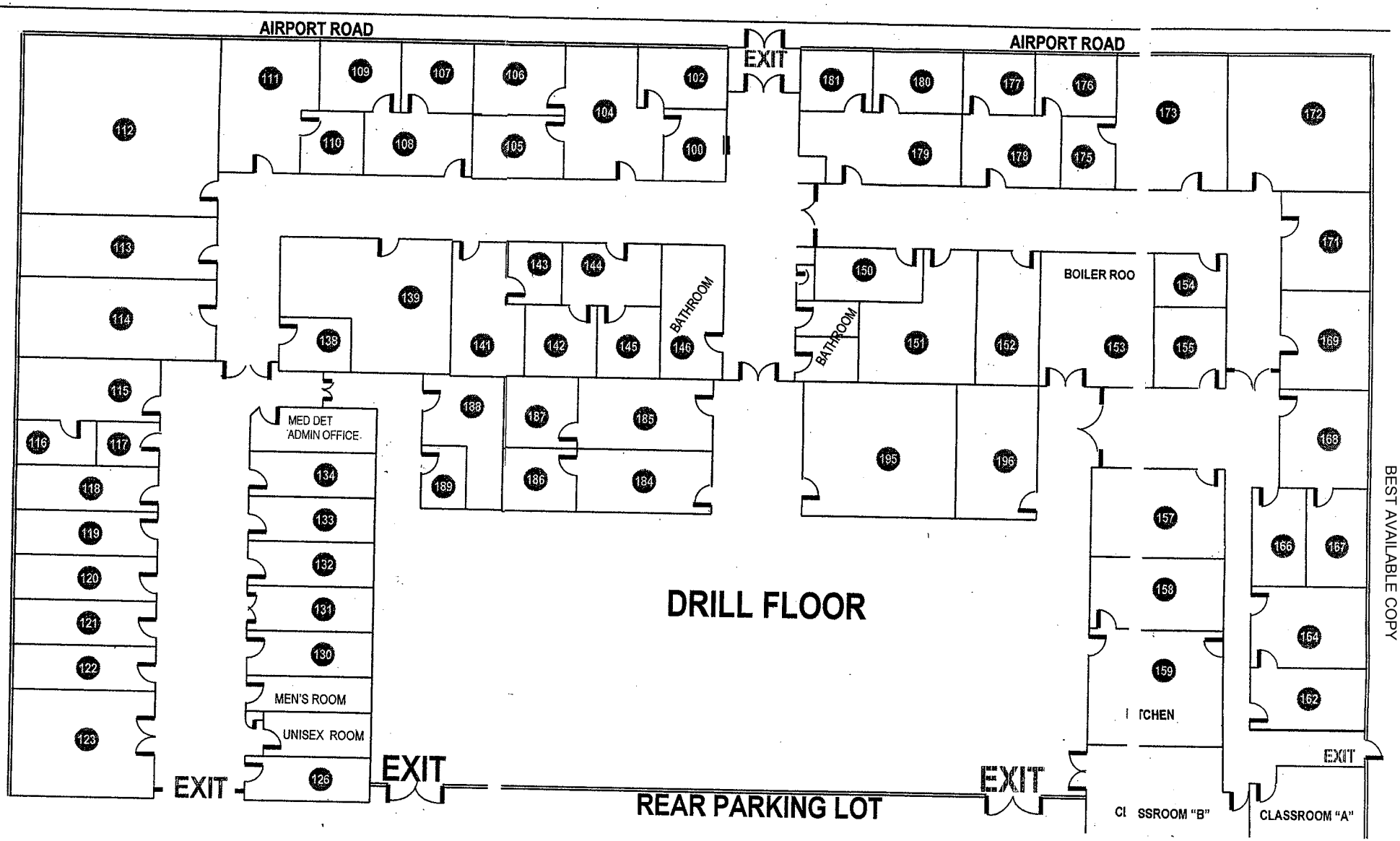
Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (1995, 1997)

U. S. Occupational Safety and Health Administration

Standard for General Industry: 29 CFR 1910

APPENDIX A

ARMORY DRAWING



APPENDIX B

PERSONNEL LIST

NOT PROVIDED

APPENDIX C

HAZARDOUS MATERIALS LIST

NOT AVAILABLE

APPENDIX D

ANALITICAL RESULTS

AMA Analytical Services, Inc.
A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP
NY ELAP
AIHA

Client:	National Guard Bureau	**Job Name:**	Warwick Armory	**Chain Of Custody:**	122763
Address:	301-IH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation	**Job Location:**	Warwick, RI	**Date Analyzed:**	02/12/2004
	Havre de Grace, Maryland . 21078	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Report Date:**	12-Feb-04

Attention: [redacted]

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		Final Result		Comments
0423505	1211-05	Flame	Wipe	****	1.000	12.00	ug/ft²	< 12	ug/ft²	
0423506	1211-07	Flame	Wipe	****	1.000	12.00	ug/ft²	77	ug/ft²	
0423507	1211-09	Flame	Wipe	****	1.000	12.00	ug/ft²	< 12	ug/ft²	
0423508	1211-14	Flame	Wipe	****	1.000	12.00	ug/ft²	< 12	ug/ft²	
0423509	1211-17	Flame	Wipe	****	1.000	12.00	ug/ft²	< 12	ug/ft²	
0423510	1211-23	Flame	Wipe	****	1.000	12.00	ug/ft²	92	ug/ft²	
0423511	1211-24	Flame	Wipe	****	1.000	12.00	ug/ft²	3100	ug/ft²	
0423512	1211-25	Flame	Wipe	****	1.000	12.00	ug/ft²	2100	ug/ft²	
0423513	1211-26	Flame	Wipe	****	1.000	12.00	ug/ft²	19000	ug/ft²	
0423514	1211-27	Flame	Wipe Blank	****	N/A	12.00	ug	< 12	ug	
0423515	1211-01	Flame	Air	513	N/A	5.85	ug/m³	< 5.8	ug/m³	
0423516	1211-02	Flame	Air	341	N/A	8.80	ug/m³	< 8.8	ug/m³	
0423517	1211-03	Flame	Air Blank	0	N/A	3.00	ug/m³	< 3	ug	

An AIHA (#8863), NVLAP (# 101143), & New York ELAP (#10920) Accredited Laboratory
4475 Forbes Blvd. • Lanham, MD 20706 • (301) 459-2640 • Toll Free (800) 346-0961 • Fax (301) 459-2643

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	National Guard Bureau	**Job Name:**	Warwick Armory	**Chain Of Custody:**	140554
Address:	301-IH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation	**Job Location:**	Warwick, RI	**Date Submitted:**	7/12/2005
	Havre de Grace, Maryland 21078	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Date Analyzed:**	7/12/2005
Attention:	[redacted]				**Report Date:** 12-Jul-05

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		Final Result		Comments
0551331	1211-04	Flame	Wipe	****	1.000	12.00 ug/ft²		24	ug/ft²	
0551332	1211-06	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551333	1211-08	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551334	1211-10	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551335	1211-11	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551336	1211-12	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551337	1211-13	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551338	1211-15	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551339	1211-16	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551340	1211-18	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551341	1211-19	Flame	Wipe	****	1.000	12.00 ug/ft²		17	ug/ft²	
0551342	1211-20	Flame	Wipe	****	1.000	12.00 ug/ft²	<	12	ug/ft²	
0551343	1211-21	Flame	Wipe	****	1.000	12.00 ug/ft²		28	ug/ft²	
0551344	1211-22	Flame	Wipe	****	1.000	12.00 ug/ft²		230	ug/ft²	

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AMA Analytical Services, Inc.

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CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	National Guard Bureau	**Job Name:**	Warwick Armory	**Chain Of Custody:**	140554
Address:	301-IH Old Bay Lane, Attn: NGB-AVN-SI, State Military Reservation	**Job Location:**	Warwick, RI	**Date Submitted:**	7/12/2005
	Havre de Grace, Maryland 21078	**Job Number:**	Not Provided	**Person Submitting:**	[redacted]
		P.O. Number:	Not Provided	**Date Analyzed:**	7/12/2005
Attention:	[redacted]			**Report Date:**	12-Jul-05

Summary of Atomic Absorption Analysis for Lead

AMA Sample Number	Client Sample Number	Analysis Type	Sample Type	Air Volume (L)	Area Wiped (ft^2)	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

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

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

[redacted]

Analyst: [redacted]

Technical Manager: [redacted]

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APPENDIX E

TRAINING CERTIFICATES

Non-Responsive

Certificate of Training

Awarded to

[redacted] Non-Responsive

For successful completion of an 8 Hour, 1 Day

Asbestos Inspector & Management Planner
Annual Refresher Training

MARCH 25, 2003

This training was approved and given in accordance with Regulations for Connecticut State Agencies RCSA 20-440 - 1-9 and RCSA 20-441 and meets the requirements of the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR10543 **Exam Grade: 100%** **Expiration Date: 03/25/2004**
Exam Date: 03/25/2003

[redacted] Non-Responsive ***IH, CSP, RS***

[redacted] Non-Responsive ***raining Director***

APPENDIX F

PHOTOGRAPHS

Photo 907: Classroom B – Wipe sample 1211-04

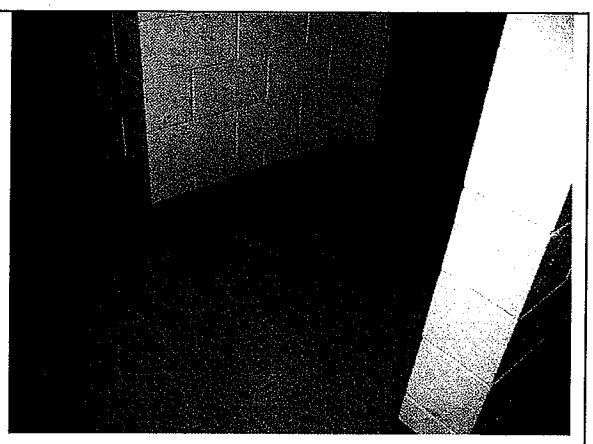

Photo 908: Hall Outside Classroom A – Wipe sample 1211-05

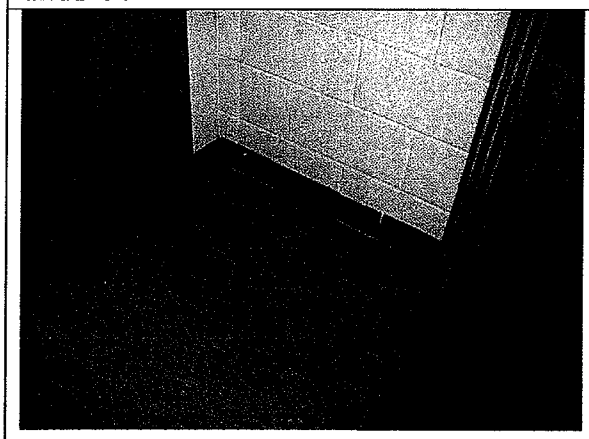

Photo 909: Room 164 – Wipe sample 1211-06

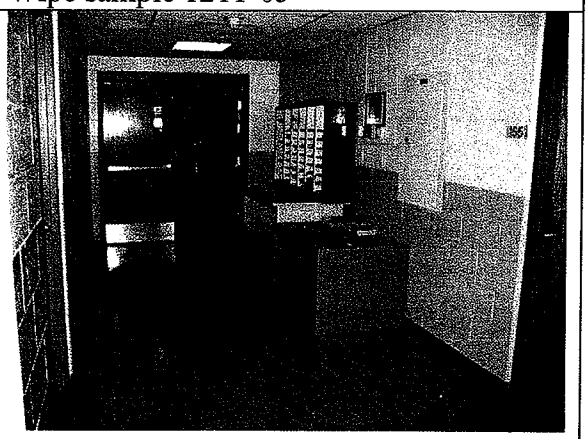

Photo 910: Hall Outside Room 157 – Wipe samples 1211-07 and 1211-08

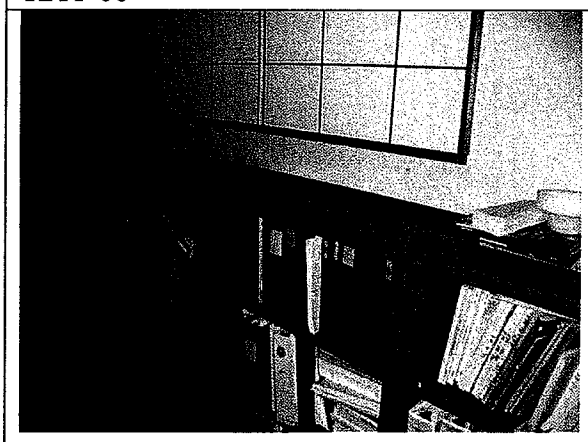

Photo 911: Room 173 – Wipe sample 1211-09

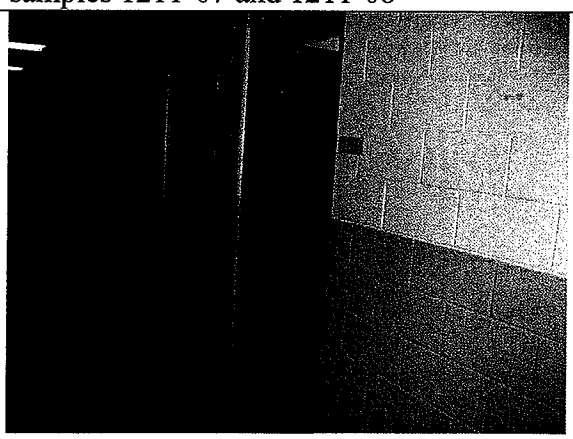

Photo 0912: Hall Outside Room 178 – Wipe sample 1211-10

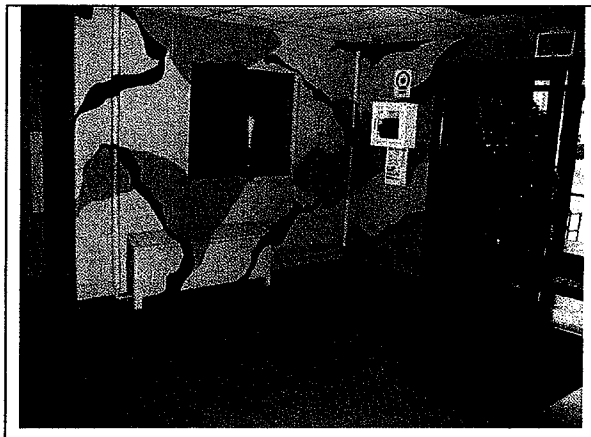

Photo 913: Foyer – Wipe samples 1211-11 and 1211-12

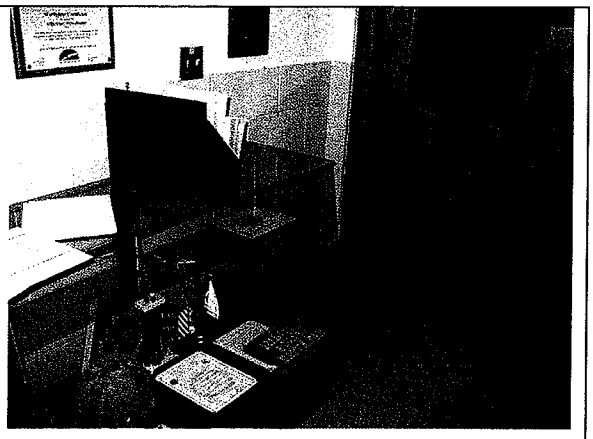

Photo 914: Hall Outside Room 104 – Wipe samples 1211-11 and 1211-12

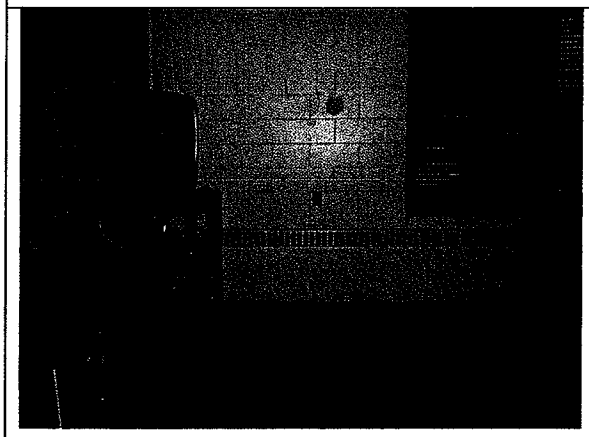

Photo 915: Room 112 – Wipe sample 1211-15

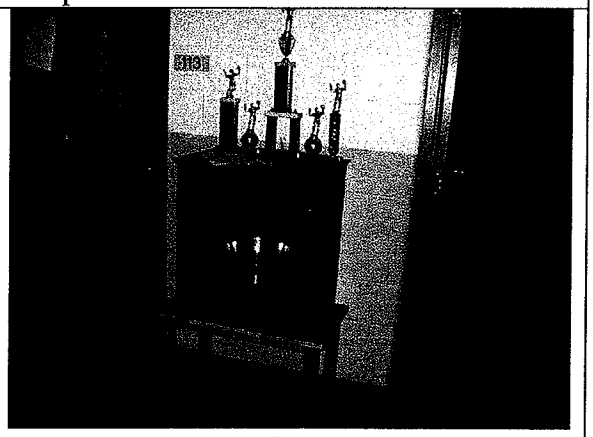

Photo 916: Hall Outside Room 112 – Wipe samples 1211-16 and 1211-17

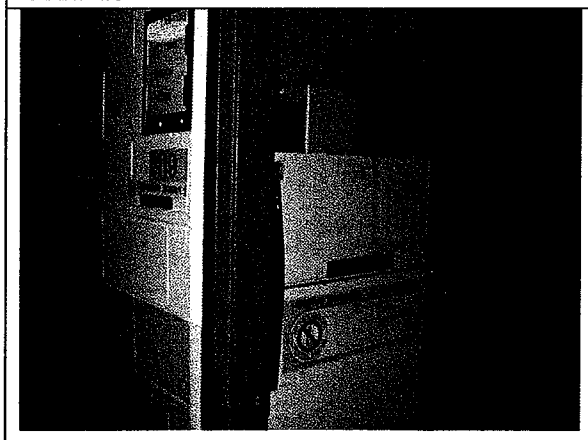

Photo 917: Room 119 – Wipe sample 1211-18

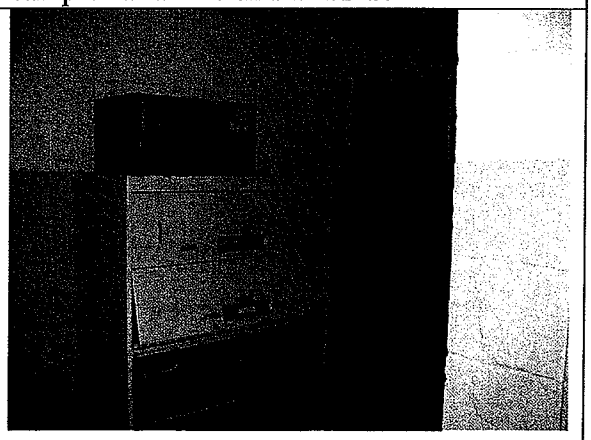

Photo 918: Hall Outside Room 188 – Wipe sample 1211-19

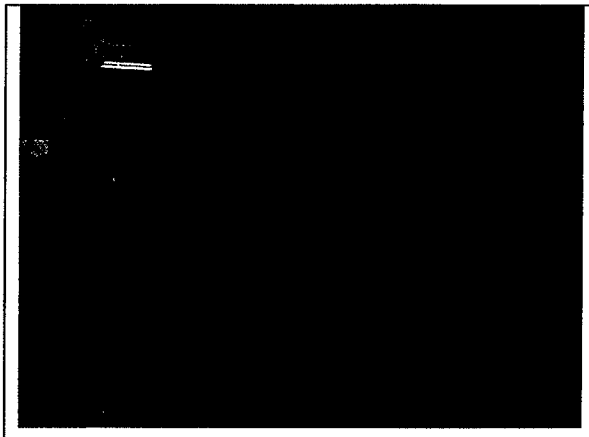

Photo 919: Drill Floor – Wipe samples 1211-20 and 1211-21

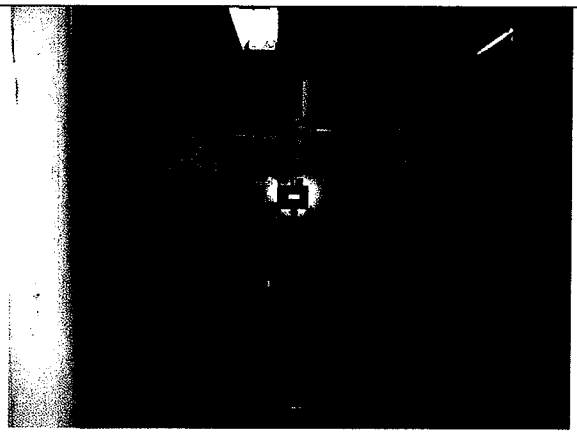

Photo 920: Boiler Room – Wipe sample 1211-22

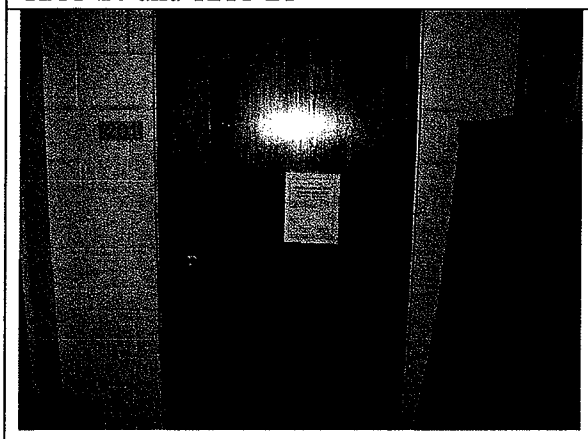

Photo 921: Entrance to Firing Range

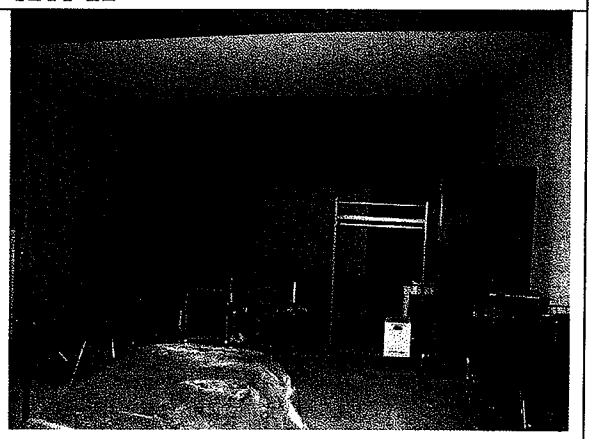

Photo 922: Firing Range – Wipe samples 1211-23, 1211-24, 1211-25, and 1211-26

Photo 923: Hallway – Water stains

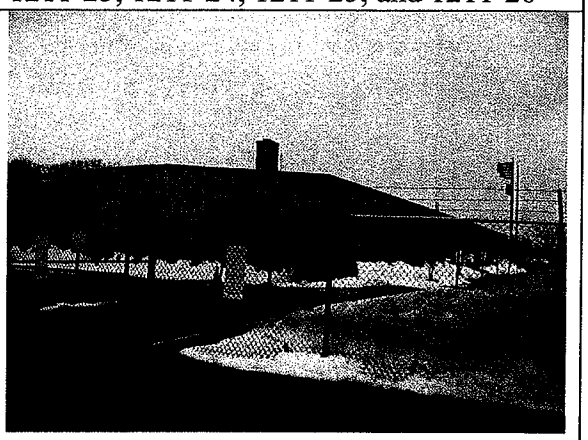

Photo 924: Exterior View

APPENDIX G

RECOMMENDATIONS FOR SURFACE LEAD DUST IN ARMORIES

Subject: Recommendations for Surface Lead Dust 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 $\mu g/ft^2$) and windowsills (250 $\mu g/ft^2$) 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 $\mu g/ft^2$ 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, the US Army Center for Health Promotion and Preventive Medicine (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. 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 on individuals in the armory were well below OSHA's permissible exposure limit for lead (29 CFR 1910.1025(c)) of 0.05 mg/m^3 averaged over an 8-hour day. Therefore, based on these conditions there is currently no overexposure to personnel from lead dust in this building.

APPENDIX H

POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES (NATIONAL GUARD REGULATION 385-15, 30 DECEMBER 2002)

NGB-AVS-SG
SUBJECT: All States (Log Number P01-0075) Army National Guard (ARNG) Safety and Occupational Health Program -- POLICY AND RESPONSIBILITIES FOR INSPECTION, EVALUATION AND OPERATION OF ARMY NATIONAL GUARD INDOOR FIRING RANGES

ADDENDUM

GUIDELINES FOR IFR REHABILITATION, CONVERSION, AND CLEANING

CONTENTS (Listed by paragraph number)

Purpose
1. This addendum establishes policy and procedures for rehabilitation, conversion, and cleaning of ARNG indoor firing ranges.

2. References
Related publications are listed below.
a. DODI 6055.1 (Department of Defense Instruction, Occupational Safety and Health (OSH) Program).
b. AR 11-34 (The Army Respiratory Protection Program).
c. AR 40-5 (Preventive Medicine).
d. NGR 385-15 Policy, Responsibilities, and Procedures for Inspection, Evaluation, and Operation of ARNG Indoor Firing Ranges).
e. 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards
f. OSHA Technical Manual, Edition VII.
g. DHEW NIOSH 76-130 (Lead Exposure and Design Considerations for Indoor Firing Ranges).

3. Explanation of Abbreviations and Terms
Abbreviations and special terms used in this publication are listed in the glossary.

4. Policy and Procedures
Conversion of Ranges. Indoor firing ranges can be safely rehabilitated or converted for other uses, such as a storage area, kitchen, or office space, provided the following –

a. Previously active ranges must be thoroughly decontaminated and cleaned to acceptable levels.

b. The level of cleanliness is to be determined by sampling. The Occupational Safety and Health Administration's (OSHA) Technical Manual, 5th Edition, provides guidance on the methods and techniques needed to collect wipe samples (Appendix A).

(1) Wipe samples must be collected and analyzed prior to and after cleaning.

(2) Post-cleaning surface wipe sample results must be less than or equal to 200 micrograms per square feet (ug/sq ft). The sampling strategy, which is the amount and location of wipe samples to be collected, is provided in Appendix B. Methods for interpreting the sample results are contained in Appendix C and D.

c. Equipment/Items previously stored in the range must be decontaminated and cleaned to acceptable levels.

(1) Samples must be collected from equipment/items stored in the range. Sample selection is critical, because the number of items stored and length of storage differs from range to range. The amount and location of the samples, should be representative of the areas where lead dust is most likely to accumulate. The more samples collected, the better the statistical comparison of the results.

(2) Samples must be collected from the smooth surfaces of the equipment/items, in so much as possible. Results of samples collected from a rough surface will be inaccurate due to the minimal surface contact of the media. Further, the likelihood of tearing the media filter is greater on rough surfaces.

(3) Samples should also be collected on items stored the longest period of time, and which have not been disturbed. Items stored closest to the bullet trap and firing line are likely to have higher concentrations of lead dust. Methods for interpreting the sample results are contained in Appendix C and D.

5. Goal
To ensure every indoor firing range is free of lead dust, and to reduce the number of unsafe ARNG indoor firing ranges.

6. Background
The Environmental Protection Agency (EPA) identifies lead as a highly toxic metal. Elemental lead is indestructible, and common in the environment. Lead can enter the body by inhalation (breathing) or ingestion (eating). In addition, lead is a cumulative poison. It accumulates in the blood, bones, and organs, including the kidneys, brain and liver. Effects include nervous and reproductive system disorders, delays in neurological and physical development, cognitive and behavioral changes, and hypertension. Symptoms include loss of appetite, difficulty sleeping, irritability, fatigue, headache, and inability to concentrate. It can stay in the bones for decades. Worker awareness and training are important to ensure that employees can recognize the symptoms of exposure and get prompt medical attention.

7. Wipe Sample Media

a. OSHA Technical Manual provides the necessary guidance on the technique needed to collect wipe samples (Appendix A). Only distilled or deionized water will be used to saturate dry sample media. At least one field blank filter must be submitted with each sample sheet. The field blank must be from the same lot, and labeled as a blank on the sample sheet. Appendix E identifies how and where to obtain sample media. Use the following guidance for determining media acceptability.

(1) Acceptable Media consists of –

(a) Ghost Wipes™ (**PREFERRED METHOD**)- Pre moistened

(b) Thirty-seven (37) millimeters (mm) mixed cellulose ester (MCE) filters, with or without the cassettes.

(c) Eleven (11) centimeter (cm) diameter Whatman ™ #40 paper

(2) Unacceptable Media consists of but is not limited to—
(a) Cotton balls
(b) Baby wipes or wet wipes

b. Documentation of Sample Collection. A Surface Wipe Sample Sheet must be completed and submitted with samples to your supporting laboratory. A copy of this form is located in Appendix G. Refer to Appendix A on how to collect wipe samples.

8. Wipe Sampling Protocol
See Appendix A.

9. Ranges Cleaning Instructions

a. Written procedures, such as a scope of work, or Standing Operating Procedure (SOP) that complies with all federal, state and local regulations must be established prior to decontamination operations. The range ventilation system will be in operation during range cleaning to ensure that a negative pressure environment is maintained. In the absence of mechanical ventilation system, all doors and windows will be sealed to eliminate fugitive emissions. A High Efficiency Particulate Air (HEPA) filtered vacuum system is the preferred method of cleanup followed by wet wiping of the range. The HEPA vacuum is designed to collect loose surface lead dust particles.

b. Any general purpose cleaning solution can be used. However, Spic and Span™ has been found to be an effective cleaning solution by other Army organizations. Mix new solutions of cleaning solution frequency. Wet wiping will require dual containers of water; one container for wetting the applicator (mops, rags, sponge, etc.) and the other container for rinsing the applicator after the dust has been wiped from the surfaces. When placed in containers, wastewater should be left to evaporate.

c. PROPERLY DISPOSE OF ALL HAZARDOUS WASTE. DO NOT PLACE LEAD CONTAMINATED WASTE INTO THE SEWER SYSTEM OR ONTO THE GROUND.

d. Mop-heads, sponges and rags will be discarded as hazardous waste following cleanup.

e. Wet cleaning by a high-pressure system is prohibited, as this method may embed the lead into the substratum and generate large quantities of unwanted hazardous waste.

f. Dry sweeping is not permitted.

g. All surface areas of the range must be cleaned. Do not remove the coating on smooth painted surfaces that are properly sealed.

h. Wood floors should receive a coat of deck enamel or urethane; concrete floors should be sealed with deck enamel and linoleum or tile floors should be waxed.

i. A progression of cleaning from top to bottom and from behind the steel backstop to the firing line should be used. After removing the sand, if applicable, and the steel backstop, areas in front of and behind the bullet trap along with the steel backstop plate(s) should be cleaned. Next, clean the ceiling, lights, baffles, retrieval system, heating system(s), and ventilation duct(s). Acoustical material should be vacuumed and removed rather than painted over.

j. A Toxic Characteristic Leaching Procedures (TCLP) test for lead only may need to be performed on the acoustical material. A TCLP test will determine if the material is classified as "hazardous" and can be disposed of in a sanitary landfill. Contact your State Environmental Office for assistance before arranging for this laboratory testing. The floor should be the last surface cleaned, starting at the bullet trap and ending behind the firing line.

k. After wet wiping all surfaces, permit the area to dry. Vacuum all surface areas until no dust or residue can be seen using the HEPA.

l. A thorough visual inspection to detect dust should be made following cleanup and prior to collecting post surface wipe samples.

m. As a variety of conditions exist in ranges, unique situation may arise and specific written guidance from your Regional Industrial Hygiene Office may be required.

10. Cleaning Stored Contaminated Equipment

a. Equipment contaminated (sample result is higher than 200 micrograms/sq ft) with lead dust must be decontaminated before it is removed from the range.

b. Equipment located near the bullet trap and firing line should be cleaned first and then removed. The cleaning method depends on the size of the equipment and the material it is comprised of, i.e. metal, wood, concrete, porus, non-porus, smooth or rough finish etc. However, either HEPA vacuum or the wet wipe method will be used. Refer to paragraph 9 for additional guidance.

c. Every attempt should be made to clean and reclaim items since disposing of equipment, as hazardous waste is costly and wasteful. Only as a last resort will the item be discarded as hazardous waste. Porous items, such as office partitions and carpet that were present during firing should be considered grossly contaminated and be discarded unless analysis proves otherwise. Consult your State Environmental Office for the proper hazardous waste disposal methods.

11. Contaminated Sand and Lead Waste
Consult your State Environmental Office for specific disposal guidance to ensure compliance with local laws and regulations.

12. Medical Surveillance

a. A pre-placement medical examination is required for all individuals involved with range cleanup operations. Consult 29 CFR 1910.1025 for additional information on medical surveillance requirements. A medical examination must include—

(1) A detailed work and medical history
(2) A thorough physical examination
(3) A respirator use evaluation
(4) A blood pressure measurement
(5) Blood sample analysis to include:
  (a) A baseline blood lead level
  (b) A complete blood count (CBC)
  (c) Blood urea nitrogen (BUN)
(6) Serum creatinine
(7) Zinc protoporphyrin
(8) A routine urine analysis
(9) Recordkeeping

b. Air Monitoring. Worker breathing zone (BZ) air samples must be collected to ensure personnel are not overexposed to airborne lead during the cleanup phase. Representative air samples will be collected on all personnel involved in the cleanup operation. These exposure levels will be used to evaluate work practices and personal protective equipment. Within five (5) working days after receipt of monitoring results, each employee will be notified in writing of the air sampling results. Contact your Regional Industrial Hygiene Office for additional information pertaining to air sampling.

13. Worker Education
OSHA 29 CFR 1910.1025 requires that workers who are potentially exposed to any lead level shall be informed of the content of Appendix A and B of this standard. A training program must be instituted for all individuals who are subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritations exists. The training program shall be repeated for personnel currently involved in range cleanup operations, at least annually, this training must be documented on DD Form 1556 or DD Form 1556-1 and filed permanently in the employee's Official Personnel File (OPF) or the soldier's Official Military Personnel File (OMPF). As a minimum, complete blocks 1, 2, 3, 7, 8, 11, 12, 13, 17, 18, 24, 33 and 36 of DD Form 1556. Place the following statement in block 18, "Do not destroy, retain this record for the duration of employment/service plus 30 years." The employer will assure that each employee is informed of the following:

a. The content of the standard and its appendices.
b. The specific nature of operations that could result in exposure to lead above the action level.
c. The purpose, proper selection, fitting, use and limitations of respirators.
d. The purpose and a description of medical surveillance program.
e. Eating and drinking are prohibited in lead contaminated areas.
f. Smoking and smoking materials will not be permitted in contaminated areas.

g. Employees must wash their hands and other exposed skin whenever they leave the work area.
h. The engineering controls and work practices associated with the individual's job assignment.
i. The contents of any compliance plan in effect.

14. Personal Protective Equipment
For housekeeping and rehabilitation the employer shall select respirators from among those approved for protection against lead dust, fume, and mist by the National Institute for Occupational Safety and Health (NIOSH). The employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134. As a minimum, personnel conducting the decontamination of the range will be provided with the following personal protective equipment.

a. Employees engaged in range rehabilitation and/or range conversion, the employer shall provide at no cost to the employee, and assure that the employee uses appropriate protective work clothing and equipment such as, but not limited to:

(1) Protective coveralls with hood and shoe covers or disposable Tyvek ™ full body suit.
(2) Disposable rubber gloves; and disposable shoe coverlets (If necessary).
(3) Full-face air purifying respirator with P-100 cartridges.

b. The employer shall provide the clothing required in a clean and dry condition at least daily to employees engaged in the conversion of indoor firing ranges.

c. The employer shall provide for the cleaning, laundering, or disposal of used or contaminated protective clothing and equipment.

d. The employer shall assure that all protective clothing is removed at the completion of a work shift only in areas designated for that purpose (Change Areas or Change Rooms).

e. The employer will ensure that contaminated protective clothing that is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area that seals sufficiently enough to prevent dispersion of lead dust.

f. The employer will further inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

15. Housekeeping
This chapter applies to all active indoor ranges classified as "safe" for use. To keep the range operating properly and to keep possible hazards to a minimum, a routine housekeeping/ maintenance program is essential.

a. The employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. To this end the range will be clean at the conclusion of each firing day.

b. The range ventilation system will be in operation during all cleaning operations, to ensure a negative pressure environment is maintained.

c. Ranges will be cleaned by using the wet method or vacuuming. A HEPA (High Efficiency Particulate Air) filtered vacuum system is the preferred method of meeting this requirement. The use of compressed air to clean floors is absolutely prohibited. If the wet method is utilized the floor should be equipped with a floor drain, and collection system. When there is no collection system, the water can be allowed to slowly evaporate leaving lead deposits/sludge. The deposits/sludge can then be collected, placed in metal drums, and stored for future delivery to an authorized hazardous waste disposal site. Drums must be labeled to identify contents, in accordance with the hazardous waste program.

d. A NIOSH approved respirator (P-100) for protection against lead dust, fume, and mist will be worn at all times while cleaning.

e. When cleaning start behind the firing line forward, cleaning the floor and horizontal surfaces.

16. Maintenance
The following are the minimum maintenance requirements, which must be performed quarterly by the range custodian, or by a person designated by the facility commander.

a. Inspect the ventilation system fan for condition of belts to ensure that they are not frayed or slipping.

b. Evaluate static pressure and compare to the baseline static pressure reading. Any changes will be reported through the safety manager to the Regional Industrial Hygienist.

c. Inspect Louvers, if applicable, to ensure they are opening fully.

d. Inspect the bullet trap for pitting or other damage and for sharp edges on venetian blind type bullet traps.

e. Bullet Trap. The bullet trap will be cleaned every 480 hours of operation at a minimum, or when the trap is three quarters full.

f. The range ventilation system will be operational during all bullet trap cleaning procedures.

g. All personnel involved in cleaning of the bullet trap will wear a NIOSH approved respirator, and proper personal protective equipment.

h. All debris from the bullet trap will be collected, package and turned in, in accordance with guidance from the environmental office.

17. Range Rehabilitation.

This chapter applies to all indoor firing ranges that have been identified as candidates for rehabilitation. This chapter further provides guidance for cleaning and/or sampling that might be required prior to the start of rehabilitation.

a. The portion(s) of the range to under go rehabilitation must be sampled to determine the level of lead contamination. Wipe samples will be taken per the established sampling protocol. See Appendix A.

b. All personnel involved in range rehabilitation will wear a NIOSH approved respirator (P-100), and proper personal protective equipment as prescribed in paragraph 14 above.

c. Prior to start of rehabilitation the environmental office must be notified to determine the disposition of lead containing debris.

18. Conversion of Indoor Ranges

Prior to the start of decontamination, employers must ensure that all procedures to be used comply with Federal, State, and local regulations. To ensure that all lead contamination is removed the following procedure is established.

a. All ranges slated for conversion will be inspected and evaluated.

b. All equipment stored in the range, if applicable, prior to the start of decontamination must be sampled, decontaminated, re-sampled and removed or turned in as lead contaminated material. See paragraph 10 above.

c. All acoustical tiles and/or sound proofing material (if applicable) must be removed and turned in as lead contaminated material through the environmental office.

d. The backstop, bullet trap, target retrieval system and firing line stations must be removed and turned in as lead containing material through the environmental office.

e. Light fixtures and ventilation system grills must be removed and decontaminated.

f. Ventilation system ducts need to be decontaminated or removed and replaced.

g. The exhaust fans and/or the complete ventilation air-handling unit (if applicable) must be decontaminated or removed.

h. Cover all openings of any component previously decontaminated prior to start of interior decontamination of the firing range.

19. Deviation

Deviations from this guidance will require a written exception to policy from your Regional Industrial Hygiene Office. Questions and/or comments regarding this subject should be directed to your Regional Industrial Hygiene Office or Chief, National Guard Bureau, Attn: NGB-AVS-S, 111 South George Mason Drive, Arlington, VA 22204-1382.

APPENDIX A
GENERAL PROCEDURES FOR COLLECTING WIPE SAMPLES

A-1 If multiple samples are to be collected at the work site, prepare a rough sketch of the area(s) or room(s), which are to be wipe sampled.

A-2 A new set of clean, impervious gloves should be used for each sample to avoid contamination of the media by previous samples and to prevent contact with the substance.

A-3 (1) If using Ghost Wipes™, tear open the individually sealed package. Remove the moistened wipe. Unfold the wipe.

(2) If using a dry media such as MCE or Whatman™ filter, moisten the filter with distilled or deionized water prior to sampling.

A-4 Place a 10 cm by 10 cm template on the area to be wiped.

A-5 Apply uniform firm pressure while wiping the area inside the template.

A-6 To insure that all portions of the partitioned area are wiped, start at the outside edge and progress toward the center making progress toward the center making concentric squares decreasing in size.

A-7 After collecting a sample, fold the filter or wipe inward and place into a container and number it. Note the number at the sample location on the sketch.

A-8 At least one blank filter treated in the same fashion but without wiping, should be submitted to the laboratory.

APPENDIX B
SAMPLING STRATEGY FOR COLLECTION OF WIPE SAMPLES

B-1 Prior to cleaning the ranges, the three samples must be collected and analyzed for total lead dust on each surface, i.e., floor, ceiling, backstop, and wall to include the plenum wall, if applicable. In addition, a total of 3 samples should be collected from areas which have been least disturbed by airflow. Established walkways should be avoided.

B-2 Samples should be staggered to different areas of the range. A grid system should be utilized. Each range surface areas should be divided evenly into 3 by 3 sections. Samples should not be collected on all one section of a wall or end of the building.

APPENDIX C
INTERPRETATION OF SAMPLE RESULTS (PRIOR TO CLEANING)

C-1 200 micrograms/sq ft or LESS
If all sample results are 200-micrograms/sq ft or less, the range can be converted and/or used for any purpose.

C-2 BETWEEN 201 and 200,000 micrograms/sq ft
Range must be decontaminated. Continued with cleaning instructions listed in paragraph 9 Sample results will be used to establish a baseline.

C-3 Over 200,000 micrograms/sq ft
Your sample media may not be capable of collecting additional lead dust and results that are above 200,000 micrograms/sq ft, and should be considered suspect.

APPENDIX C (Continued)

C-4 High sample results may exist due to personnel walking or moving equipment/vehicles over the range surface causing the lead dust to be "ground" into the substratum. For examples, a maintenance activity may have oversprayed paint or spilled solvents onto the surface Regional Industrial Hygiene Office for specific guidance.

APPENDIX D

INTERPRETATION OF SAMPLE RESULTS (AFTER CLEANING)

D-1 200 micrograms/sq. ft or less
If all sample results are less than 200 micrograms/sq ft, the range can be converted and/or used for any purpose after a coat of lead-free latex paint is applied.

APPENDIX E

RECOMMENDED SAMPLE MEDIA AND CONTAINERS

E-1 The following is a list of vendors, which supply the media and containers necessary to collect air and lead surface wipe samples. The information is provided to assist in obtaining the proper media and containers. Alternative vendors are available and may be utilized, if known. Contact your Regional Industrial Hygiene Office for additional assistance or clarification.

E-2 Pre-loaded 3 piece cassette with mixed cellulose ester (MCE) filter and pad, 37 millimeter (mm), pore size 0.8 microns, breathing zone (BZ) and general area (GA) air samples.

Order From	Catalog Number
a. Millipore Corp. Ashdy Road Bedford, MA 01730 617-275-9200 800-225-1380	MAWP-037-A0
b. Gelman Sciences 600 South Wagner Rd Ann Arbor, MI 48106 313-665-0651 800-521-1520	64678 (GN-4)
c. Supelco. Inc. Supelco Park Bellefonte, PA 16823 800-247-6628 800-359-3041	2-3368M

E-3 37 mm MCE Filter with pad, no cassette included, for lead surface wipe samples.

Order From	Catalog Number
a. Supelco Inc. Supelco Park Bellefonte, PA 16823	2-3381IM

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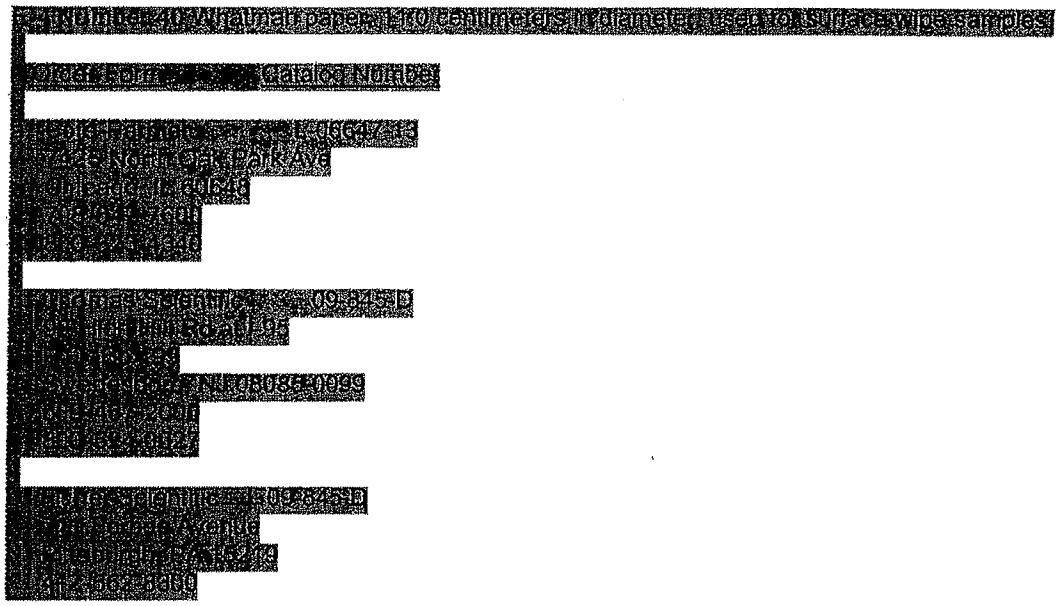
APPENDIX E (Continued)

800-247-6628
800-359-3041

b. Millipore Corp. AAWP-037-00
Ashdy Road
Bedford, MA 01730
617-275-9200
800-225-1380

c. SKC, Inc. 225-5
334 Valley View Rd.
Eighty Four, PA 15330
412-941-9701
800-752-8472



E-5. Glass container (25 milliliter) for collection and shipment of media.

Order From Catalog Number

a. Pierce Chemical Co. 13219 (screw cap)
P.O. Box 117
Rockford, IL 61105
815-968-0747
800-874-3723

b. Alltech Associates, Inc. 95321 (screw cap)
Applied Science Labs
2051 Waukegan Rd.
Deerfield, IL 60015
312-948-8600

APPENDIX E (Continued)

800-255-8324

E-6. Ghost Wipes™.

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC4200

E-7. Ghost Wipe™ Containers

Order From	Catalog Number
Environmental Express 490 Wando Park Blvd. Mt. Pleasant, SC 29464 1-800-343-5319	SC499

E-8. Plastic ziplock bags can be obtained through the Army logistics system. Many sizes are available. Contact your supporting logistics branch for assistance.

E-9. Distilled water can be purchased at larger grocery stores, usually by the gallon, at a cost of approximately $1.25. Deionized water can be obtained at local and state water labs or a hospital.

APPENDIX F
EXAMPLES OF COMPUTATION OF LEAD LEVELS FROM WIPE SAMPLE RESULTS

Sample results will be returned in the form of micrograms. The results must be converted to micrograms per square foot. This can be accomplished by following the examples listed below:

$$\frac{75 \text{ ug}}{100 \text{ cm}^2} \quad \frac{929 \text{ cm}^2}{1 \text{ sq ft}}$$

$$\frac{75 \times 929}{100} = \frac{69675}{100} = 696.75 \text{ug/sq ft}$$

ug – Microgram

Cm2 – Centimeters squared

Sq ft – Square foot

APPENDIX G
SURFACE WIPE SAMPLING SHEET

Industrial Hygiene Surface Wipe Sample Sheet			
Return Address		Point of Contact *(name & phone #)*	
		Samples Collected By	
Sampled Facility	City	State	Location *(bldg/area)*
Description of Operation		Date Collected	Date Shipped
Analysis Desired			
Sampling Data			

Lab Use Only	Sample #	Results	Remarks
Comments to Lab:			

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APPENDIX H
AIR SAMPLING SHEET

Industrial Hygiene Air Sample Sheet

Return Address		**Point of Contact** *(name/phone #)*	
		Samples Collected By	
Sampled Facility	**City**	**State**	**Location** *(bldg/area)*
Description of Operation	___ Persons Exposed	___ Hrs/Day	**Method of Collection**
Analysis Desired			
Sampling Data			

Sample No.								
Pump No.								***B***
Time On								***L***
Time Off								***A***
Total Time (min)								***N***
Flow Rate (LPM)								***K***
Volume (liters)								
GA/BZ								
Employee Name/ID								
Laboratory No.								

Calibration Information

Pump No.	Calibration (LPM)		Rotameter Setting	Date
	Pre-Use	Post-Use		

Name of Calibrator	Calibration Date	Pump Manufacturer
Comments to Lab:		

APPENDIX I
ABBREVIATIONS AND TERMS

Section I
Abbreviations

ARNG
Army National Guard

BUN
Blood urea nitrogen

BZ
Breathing zone

CBC
Complete blood count

CFR
Code of Federal Regulations

cm
Centimeter

DHEW
Department of Health, Education and Welfare

EPA
Environmental Protection Agency

GA
General area

OMPF
Official Military Personnel File

OPF
Official Personnel File

OSHA
Occupational Safety and Health Administration

TCLP
Toxic Characteristic Leaching Procedures

ug/sq ft
Micrograms per square foot

APPENDIX I (Continued)

Section II
Terms

HEPA
Refers to high efficiency particulate air filter systems capable of capturing up to 99.97 percent of particles 0.3 microns in size or larger.

Lead-Contaminated Range
It is assumed that all indoor ranges, which have been fired in, are lead-contaminated.

Wipe Sample
The terms wipe, swipe, or smear samples are use synonymously to describe the techniques utilized for assessing lead surface contamination.

NATIONAL GUARD BUREAU
ARMY NATIONAL GUARD
REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

NGB-ARS-IHNE (40-5f) 5 September 2008

EXECUTIVE SUMMARY
LEAD SURFACE WIPE SAMPLING OF
FORMER INDOOR FIRING RANGE
WARWICK, RI, 07 AUGUST 2008

1. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Warwick RI Armory.

2. CONCLUSION. The former IFR in the Warwick Armory is contaminated with lead and needs to be cleaned prior to conversion.

3. RECOMMENDATIONS.

   a. Decontamination Requirements. Clean and decontaminate the former IFR in accordance with guidance in NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

   b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the decontamination and cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

   c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

   d. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

   e. Additional Sampling. Collect additional samples once the soundproofing material is removed. (**RAC 4**) (NG Pam 420-15, reference 4)

   f. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

NATIONAL GUARD BUREAU
ARMY NATIONAL GUARD
REGION NORTH INDUSTRIAL HYGIENE OFFICE
ATTN: NGB-ARS-IHNE
301-IH OLD BAY LANE
HAVRE DE GRACE, MD 21078

LEAD SURFACE WIPE SAMPLING OF FORMER INDOOR FIRING RANGE WARWICK, RI, 07 AUGUST 2008

1. REFERENCES. See Appendix A.

2. PURPOSE. The purpose of this sampling project was to determine the presence and possible extent of any lead contamination in the former Indoor Firing Range (IFR) in the Warwick RI Armory.

3. BACKGOUND.

   a. General.

      (1) The Environmental Office in the State of Rhode Island initiated a project to decontaminate and convert four of their former IFRs.

      (2) The National Guard Bureau (NGB) Region North Industrial Hygiene Office was contacted to provide assistance evaluating the extent of the lead contamination in the former IFR.

      (3) The NGB Region North Industrial Hygiene Office requested support through the United States Army Center for Health Promotion and Preventive Medicine – North (USACHPPM-North) to accomplish this request.

   b. Survey Personnel. This sampling project was conducted by Mr. [redacted] Industrial Hygienist, from USACHPPM-North, Fort Meade, Maryland. CPT [redacted] Occupational Health Nurse, and SGT [redacted] Occupational Health / Industrial Hygiene Technician, both with the Rhode Island Army National Guard (RI-ARNG) Occupational Health Office, and [redacted] Supervisor of Environmental Systems for the RI-ARNG, all assisted or observed during the sample collection.

4. METHODOLOGY.

a. Assessment Criteria.

(1) The Department of Defense, through the Department of Defense Instruction (DODI) 6055.1, sections E3.4.1.1 and E3.4.2.1, directs the United States Army to provide healthful work environments in accordance with the Occupational Safety and Health Administration (OSHA) standards (reference 1).

(2) Department of the Army Pamphlet 40-503, Industrial Hygiene Program, section 1-8, states that Army occupational exposure criteria will be based on the more stringent of standards published by OSHA as Permissible Exposure Limits (PELs), guidance from the American Conference of Governmental Industrial Hygienists (ACGIH) as Threshold Limit Values (TLVs®), or guidance from other organizations when there are no standards published by OSHA or ACGIH (references 2 and 3).

(3) National Guard Pamphlet (NG Pam) 420-15, section 1-4.b.(2) requires the results of clearance surface wipe samples to be under 200 micrograms of lead per square foot ($\mu g/ft^2$) (reference 4).

b. Methodology.

(1) Procedures. Surface wipe sampling methods were conducted in accordance with OSHA's Technical Manual, 5th edition (reference 5).

(2) Media. Ghost Wipes® were used for sample collection and were placed in 68mL HotBlock™ digestion vessels. Templates (10 cm x 10 cm) were used to ensure uniform wipe area.

(3) Lab Analysis. All samples were sent to AMA Analytical Services, Inc, and were analyzed using the Environmental Protection Agency (EPA) Methods 600/R-93/200(M) and 7420 (references 6 and 7).

c. Risk Assessment Codes (RACs). RACs are assigned to recommendations to help quantify risks to personnel and to aid in the establishment of funding priorities for corrective actions. RACs are determined by using the RAC table

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® Ghost Wipes is a registerd trademark of Environmental Express, Mt Pleasant, SC.
™ HotBlock is a trade mark of Environmental Express, Mt Pleasant, SC.

from the DODI 6055.1 (reference 1). This table is provided in Appendix B of this report.

5. FINDINGS AND DISCUSSION.

a. General. Prior to this visit, the bullet trap and some baffles had been removed from the Warwick location. No other cleaning or conversion had been attempted at this facility.

b. Wipe Sampling. Surface wipe samples were collected in accordance with the guidance provided in NG Pam 420-15. In addition, five samples were collected outside the former IFR: two in the IFR anteroom and three on the drill floor. A list of sampling locations is presented in Appendix C of this report.

c. Results. Out of 23 samples collected, 20 tested positive for lead: 12 of the 20 were between 1,000 and 100,000 $\mu g/ft^2$ and 2 were greater than 1,000,000 $\mu g/ft^2$. Complete surface wipe sample results are provided in Appendix C of this report.

d. Soundproofing Material. Initial testing behind the soundproofing material did not reveal the presence of lead.

6. CONCLUSION. The former IFR in the Warwick Armory is contaminated with lead and needs to be cleaned prior to conversion.

7. RECOMMENDATIONS.

a. Decontamination Requirements. Clean and decontaminate the former IFR in accordance with guidance in NG Pam 420-15. (**RAC 3**) (NG Pam 420-15, reference 4)

b. PPE. Wear appropriate PPE (P100 respirator, coveralls, gloves, boots, glasses, etc.) during the decontamination and cleaning of the former IFR. (**RAC 3**) (29 CFR 1910.132 and 1910.1025, references 8 and 9)

c. Employee Training. Provide training on lead and the health effects of exposure to lead. (**RAC 3**) (29 CFR 1910.1025(l), reference 9)

d. Employee Awareness. Notify the employee of the air monitoring results; copy furnish to the employee's personnel and occupational medical files. (**RAC 3**) (29 CFR 1910.1025(d)(8), reference 9)

NGB-ARS-IHNE
SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warwick, RI, 07 August 2008

e. Additional Sampling. Collect additional samples once the soundproofing material is removed. (**RAC 4**) (NG Pam 420-15, reference 4)

f. Continued Occupational Assessment. Enroll all workers involved with the conversion of a former IFR in the Rhode Island Army National Guard Medical Surveillance Program. (**NO RAC ASSIGNED**) (29 CFR 1910.1025(j), reference 9)

8. ADDITIONAL ASSISTANCE. Point of contact for this project is Ms. Non-Responsive Non-Responsive NGB Regional Industrial Hygienist, (410) 942-0273, ext 3.

Non-Responsive
Industrial Hygienist

APPROVED BY:

Non-Responsive
NGB Regional Industrial Hygienist

APPENDIX A
REFERENCES

1. Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998.

2. Department of the Army Pamphlet 40-503, Industrial Hygiene Program, 30 October 2000.

3. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2007, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

4. National Guard Pamphlet 420-15, Guidelines and Procedures for Rehabilitation and Conversion of Indoor Firing Ranges, 3 November 2006.

5. Occupational Safety and Health Administration Technical Manual, TED 01-00-015 [TED 1-0.15A], 5th Edition.

6. Environmental Protection Agency (EPA) Method 600/R-93/200(M), Field Analysis of Lead in Paint, Bulk Dust, and Soil by Ultrasonic, Acid Digestion and Colorimetric Measurement, September 1993.

7. EPA Method 7420, Lead (Atomic Absorption, Direct Aspiration), 1986.

8. Title 29, Code of Federal Regulations (CFR), Part 1910.132, Personal Protective Equipment, 2008.

9. Title 29 CFR Part 1910.1025, Lead, 2008.

APPENDIX B
DERIVING RISK ASSESSMENT CODES (RACs) FOR HEALTH HAZARDS

Taken From Table 2 of Department of Defense Instruction 6055.1, Department of Defense Safety and Occupational Health Program, 19 August 1998. (reference 1)

1. HEALTH HAZARD SEVERITY CODE (HHSC). Using the following procedures to assess points, determine the health hazard severity category (HHSC). The HHSC reflects the magnitude of exposure to a physical, chemical, or biological agent and the medical effects of exposure.

a. Exposure Points Assessed

AER POSSIBLE?	***Exposure Conditions***			
	< AL	**Occasionally > AL Always < OEL**	**> AL < = OEL**	**> OEL**
NO	0	3	5	7
YES	1-2	4	6	8

AER = Alternate exposure route, such as skin absorption, ingestion.
AL = Action level, DoD component threshold that triggers surveillance actions, such as microWatts/cm^2, dB, parts per million.
OEL = Occupational Exposure Limit, DoD exposure limit, such as Threshold Limit Value and Permissible Exposure Limit.

b. Medical Effects Points Assessed.

Condition	***Points***
No medical effect, such as nuisance noise and nuisance odor	0
Temporary reversible illness requiring supportive treatment, such as eye irritation and sore throat	1-2
Temporary reversible illness with a variable but limited period of disability, such as metal fume fever	3-4
Permanent, non-severe illness or loss of capacity, such as permanent hearing loss	5-6
Permanent, severe, disabling irreversible illness or death, such as asbestosis and lung cancer	7-8

c. Determine the HHSC by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	***HHSC***
13-16	I
9-12	II
5-8	III
0-4	IV

2. ILLNESS PROBABILITY CODE (IPC). Using the following guides to assess points, determine the IPC for health hazards. The IPC is a function of the duration of exposure and the number of exposed personnel.

a. Duration of Exposure Points Assessed

Type of *Exposure*	***Exposure Duration***		
	1-8 hr/wk	**>8hr/wk, not continuous**	**Continuous**
Irregular, intermittent	1-2	4-6	-
Regular, periodic	2-3	5-7	8

b. Number of Exposed Personnel Points Assessed

Number of Exposed Personnel	***Points***
<5	1-2
5 to 9	3-4
10 to 49	5-6
>49	7-8

c. Determine the IPC for health hazards by totaling the points assessed and using the following guide:

Total Points (sum of A and B, above)	*IPC*
14-16	A
10-13	B
5-9	C
<5	D

3. Determine the RAC for health hazards by using the following matrix to measure health hazard severity and mishap probability factors.

HEALTH HAZARD SEVERITY CODE	*ILLNESS PROBABILITY CODE*			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

4. RAC DESCRIPTOR

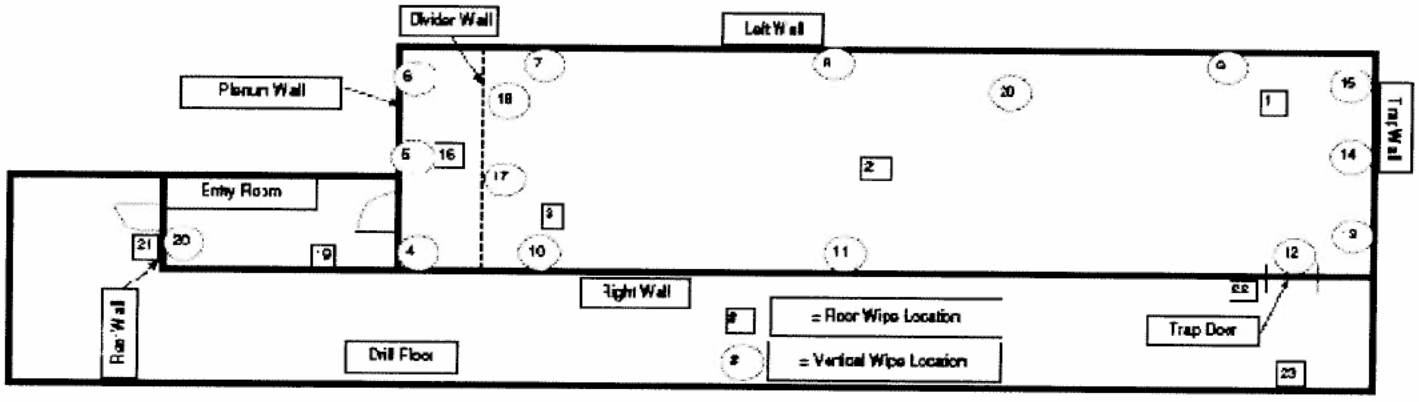
RAC	DESCRIPTOR
1	CRITICAL
2	SERIOUS
3	MODERATE
4	MINOR
5	NEGLIGIBLE

NGB-ARS-IHNE

SUBJECT: Lead Surface Wipe Sampling of Former Indoor Firing Range, Warwick, RI, 07 August 2008

APPENDIX C
SURFACE WIPE SAMPLE RESULTS: WARWICK, RI

Sample	Result		Location	Area	Distance From Wall: Trap	Plenum	Left	Right	Vertical Ht:	Other:
1	1200000	µg/ft²	Floor		6 ft		6 ft			
2	14000	µg/ft²	Floor		36 ft		12 ft			
3	9800	µg/ft²	Floor		69 ft			6 ft		
4	580	µg/ft²	Wall	Rear				Adjacent	4th block	
5	220	µg/ft²	Wall	Rear				12 ft	6th block	
6	280	µg/ft²	Wall	Rear			3 ft		9th block	
7	550	µg/ft²	Wall	Left	69 ft				2nd block	Behind metal panel
8	900	µg/ft²	Wall	Left	27 ft				9th block	
9	35000	µg/ft²	Wall	Left	3 ft				5th block	
10	< 110	µg/ft²	Wall	Right	39 ft				4th block	Behind material
11	2500	µg/ft²	Wall	Right	21 ft				8th block	
12	2200000	µg/ft²	Wall	Right	3 ft				lower ledge	
13	65000	µg/ft²	Wall	Trap				3 ft	5th block	
14	51000	µg/ft²	Wall	Trap			15 ft		8th block	
15	92000	µg/ft²	Wall	Trap			6 ft		3rd block	
16	2600	µg/ft²	Floor	Plenum		3 ft		12 ft		
17	1100	µg/ft²	Wall	Plenum				9 ft	1 ft	
18	2900	µg/ft²	Wall	Plenum			6 ft		6 ft	
19	10000	µg/ft²	Floor	Entry Room		3 ft		1 ft		
20	120	µg/ft²	Wall, Rear	Entry Room				Adjacent	7th block	
21	390	µg/ft²	Floor	Drill Hall					To right of door as enter Entry Room	
22	6800	µg/ft²	Floor	Drill Hall					To left of trap door	
23	< 110	µg/ft²	Floor	Drill Hall					15 ft from center of trap door	



Industrial Hygiene Report

Survey Performed by: Hofman Safety & Industrial Hygiene Consulting, Inc.
2 Pennwood Road
Lebanon, PA 17042
Phone: 717-304-8876

Facility: RC - Armory
Building: Armory Warwick
Date of Survey: 20 July 2012
Location: Warwick, RI
Address: 541 Airport Road
Warwick, RI 02886
Phone: 401-275-4420

Draft Report Submitted: 20 April 2013
Comments Received: 29 April 2013
Final Report Submitted: 4 May 2013

POC: MSG Non-Responsive
POC Phone: Non-Responsive

Report submitted to:
NGB Region North IH Office
301-IH Old Bay Lane
Havre de Grace, MD 21078
Phone: 410-942-0273

State OH Officer: Major Non-Responsive
Bldg P-1 (Medical Section)
1 Minuteman Way
North Kingston, RI 02852
Phone: Non-Responsive

Table of Contents

Industrial Hygiene Report of Findings
Rhode Island Army National Guard
Warwick
Facility: Armory / Readiness Center
July 20, 2012

Executive Summary

An industrial hygiene evaluation was conducted at the Rhode Island Army National Guard Armory / Readiness Center located in Warwick, Rhode Island on July 20, 2012.

A few issues of minor to moderate concern were identified. There was a 55-gallon drum of a chemical in the Storage Building Mechanical Room that could not be readily identified. After closer examination it appeared to contain a corrosive. The container would need to be labeled and if the chemical is a corrosive, an eyewash / drench shower would be required. All five wipe samples for lead contamination were negative. All four samples for asbestos were negative. Lighting levels are generally acceptable for work performed, with four areas of low lighting identified. There are several confined spaces at the site. A procedure to assure adequate warning and safe entry by outside organizations should be prepared, including a list of spaces at the site, awareness training on hazards for the Armory workers and application of warning signage. There was no site-specific written Hazard Communication Program. There was no site-specific Personal Protective Equipment (PPE) Program and a hazard assessment was not conducted. Analysis of site-specific hazards and controls is necessary to comply with regulations. There were a few areas of high carbon dioxide levels; this indicates inadequate outdoor air intake. While most housekeeping was acceptable, a hot water / mechanical room in the West end of the Supply Building was near impossible to enter and a fire extinguisher was blocked. The building roof leaks. These water intrusions can lead to a host of health problems associated with mold growth and further deterioration of the building structure. Therefore, it was recommended that these issues be addressed in a comprehensive fashion and that any future instances be addressed promptly.

Operation Description

The Warwick Armory (Readiness Center) in Warwick, Rhode Island is a multi-unit, multi-use facility. It houses the 43rd and 118th Units and the State Family Program. The functions carried out include: planning, logistics, storage, and administration. The family program provides counseling and access to services available to military families. Since the family support center is open to the public, children do visit the facility. This wing of the building used to house a medical facility including exam rooms, x-ray equipment and hearing tests equipment, all of which has been removed.

The facility normally houses approximately 44 workers, 13 of which are civilians working at the Family Support Group in the eastern wing of the Armory building. The facility reports 52,025 square feet (ft^2) under roof, which includes the main Armory building (28,961 ft^2) and a storage building (23,064 ft^2), which also houses some other functions including a physical fitness facility and locker rooms. The Armory building includes many offices, several training and meeting rooms, a kitchen, a boiler room, and a drill floor. It also houses the Tactical Training Operations Center (TTOC) which is relatively new. The TTOC used to house an indoor firing range. It was reported that the firing range had not been used in 10 years and that a major remediation and

cleanup occurred in 2010. Individual Company flammable storage cabinets are located in the storage building. The floor diagram can be found in Appendix B. Photographs can be found in Appendix C.

Chemical and Physical Agents

There are limited chemicals used at the facility which include lubricants for weapons and normal housekeeping supplies. The supply clerks have some exposure to predominately sealed containers of chemicals, such as weapon cleaning/lubricating fluids. During drill weekends, obviously this exposure would be more pronounced. The office and administrative workers have exposure to commercial cleaning supplies.

Two chemical storage cabinets were located in the Storage building, one each in the 43rd and 118th supply area. Each cabinet had a chemical list and material safety data sheets (MSDS) posted on the cabinets. Chemicals were labeled and stored in designated areas and flammable storage cabinets.

Five wipe samples of 100 square centimeters were taken on the day of the assessment. Since this facility used to contain a firing range and since it was known that children visit the facility, some additional samples were taken in the family support area. Wipe samples were collected using Ghost-Wipe sample media and analyzed for lead by AMA Analytical Services, Inc., an American Industrial Hygiene Association (AIHA) Accredited laboratory. Results are reported in micrograms per square foot ($\mu g/ft^2$). (Ref 36) Lead was not detected in any of the wipe samples collected (see Table A.)

Table A – Wipe Sampling Results

Sample No.	Location	Lead $\mu g/ft^2$
WAR ARM W52	On Top of Refrigerator in 43rd Supply Room	< 110
WAR ARM W53	On Top of Electrical Box – TTOC Electronics	< 110
WAR ARM W54	Break Room On Top of Electric Box - TTOC	< 110
WAR ARM W57	On Top of Refrigerator in Family Support Break Room	< 110
WAR ARM W58	On Top of Bookcase in Family Support Room 123	< 110
WAR ARM W59	Blank - Reporting Limit – per clean wipe	< 12 µg
	OSHA/HUD Decontamination Level	200

ND = none detected

Sample Media: Ghost Wipes

$\mu g/ft^2$ = micrograms per square foot

< = less than or equal to the number shown

µg = micrograms

Four bulk samples were collected and analyzed for percentage of asbestos by ALM Analytical Services, Inc., an AIHA Accredited laboratory. Bulk samples of hot water pipe insulation were collected in the Supply Building mechanical room. Bulk samples of floor tile and floor tile mastic were collected from the Supply Building hallway. There was no asbestos detected in any sample (see Table B.)

Table B – Bulk Asbestos Sample Results

Sample No.	Location	Asbestos %
WAR ARM B50	Hot Water Pipe Insulation – Front Supply W	None Detected
WAR ARM B51	Hot Water Pipe Insulation – Rear Supply W	None Detected
WAR ARM B55	Floor Tile – Supply Building Hallway	None Detected
WAR ARM B56	Floor Tile Mastic – Supply Building Hallway	None Detected

A 55 gallon drum of some material, believed to be Borax, showing a corrosive warning, was identified in the Mechanical Room for the Supply Building. The label was badly deteriorated and could not be read. All chemicals must have legible identification and display hazard warnings for proper personal protection and control. The reference for this is OSHA's Hazard Communication Standard (29 CFR 1910.1200.) **RAC 3 - Health (Chemical Labeling)** In addition, based on what this is used for and how often, 55 gallons may be an excessive amount of chemical to be kept in the mechanical room. Facilities management would need to investigate and make a determination, including whether secondary containment would be needed. Also, if this is in fact a corrosive substance, an eye wash / drench shower would be required per OSHA regulations at 29 CFR 1910.151(c). **RAC 3 - Health (Eye Wash)**

Ventilation
There were no vehicle exhausts, battery charging rooms, or welding or paint booth ventilation systems to measure in the Warwick Armory. The kitchen was clean and used for food set up, but not typically for cooking. Additional information on ventilation can be found on Page 5 under Indoor Air Quality.

Noise
Full-shift noise dosimetry was not conducted since there were no activities that generate high noise levels. Workers in the supply, training and office areas did not use pneumatic tools or discharge weapons or operate vehicles or equipment that would generate excessive noise levels.

Lighting
A lighting survey of the facility was conducted and four areas were found to be insufficient for the work performed: the Drill/Assembly Floor, Boiler Room, an office, and Gym. (Ref. 8) **(RAC 4 – Safety (Illumination))**. Survey results can be found in Table C. The time of day was afternoon, and there was minimal light filtering in through the windows since it had been cloudy/raining all day. In the Drill/Assembly floor the lighting measurement was 23 foot-candles (fc); the Gym was 13 foot-candles (fc); the Boiler Room was 18 fc; and an office (Room 309) was 28 fc. The standard for lighting in all four areas is 30 fc. All other areas were adequate for the work performed.

Table C - Lighting Survey Results

Location of Measurement	Foot Candles	Standard (Ref. 8)
Armory – Main Building		
Room 173 - Office	39	30
Room 168 - Office	48	30
Classroom NW – sectional classroom	45	30
Kitchen	59	50
Drill/Assembly Floor	23	30
Tactical Training Operations Center (TTOC)	90	30
Room 120 – Family Assist Office	65	30
Room 130– Family Assist Office	43	30
Room 123– Family Assist Office	37	30
S-3 Section Room 110	49	30
S-1 Section Room 118 MP	30	30
BDE Conference Room (1055)	42	30
Boiler Room	18	30
Armory – Supply Building		
Room 309 (Room 1007 on drawing)	28	30
43rd Supply Office	40	30
118th Supply Office	45	30
Gym	13	30

Reference for lighting standards is the American National Standards Institute, Inc. / Illuminating Engineering Society of North America, RP-7-01, Lighting Industrial Facilities, 2001. Shaded areas do not meet the light standard requirements. Area measurements were taken approximately 4 ½ feet from floor level; measurements taken at desks were approximately 30 inches from floor level.

Personal Protective Equipment & Other Controls

As this is a readiness center / office setting, there is little need for Personal Protective Equipment (PPE.) There is some PPE located in the supply areas for chemical handling around the flammable cabinets. Cleaning is performed by the Guard members and there is some PPE in the supply closet. Some general comments on PPE are addressed under "Written Programs" below. There was an eyewash station located in the 43rd supply area.

Ergonomics

A few of the workers at this facility may have some ergonomic risks from lifting supplies and equipment. This would mostly be in the supply building. Computer stations have been set up with attention to ergonomic concerns. There were few ergonomic concerns seen in other duties at the facility.

Written Programs

1. Confined Spaces (29 CFR 1910.146) – There are several confined spaces on site. These include: a vault leading to 6000 gallon fuel oil tank, and a pit/vault in the Boiler Room. Photo included in Appendix C. There is no written site-specific Confined Space Program. While it is unlikely that Guard members at this Armory would enter these spaces, the risks remain. Since the confined spaces are on the National Guard property, and since the spaces are under

the control of the Armory, a "procedure" should be established to assure any entry by "other" groups can be conducted safely. At a minimum, it is recommended that Armory employees be provided with awareness training and that all the spaces be labeled per OSHA regulations at 29 CFR 1910.146. (Ref. 16) (The RI Occupational Health Office has prepared a written Confined Space Program dated 6 March 2012 that could be implemented assuming proper training and equipment, e.g., real-time air monitoring meters, are available. However, it should be noted that no confined space permit form or checklist was included in this document.) 29 CFR 1910.146. (Ref. 16) **(RAC 3 – Safety & Health (Signage & Written Confined Space Program or Procedure))**

2. Hearing Conservation (29 CFR 1910.95 and DA PAM 40-501) – There did not appear to be any noise issues at this facility, therefore, a Hearing Conservation Program would not normally be required. (See additional comments below.)
3. Respiratory Protection (29 CFR 1910.134) – There did not appear to be any air contaminants requiring use of respiratory protection. At most, filtering facepiece respirators may be used for clean-up. This would require provision of Voluntary Use per OSHA regulations at 29 CFR 1910.134. See further discussion below.
4. HAZCOM (29 CFR 1910.1200) - There is no site-specific written Hazard Communication Program available at the facility. The safety manual dated 15 March 1996 does contain a Hazard Communication Program that could be used by the Armory. Chemical lists and MSDSs are available, typically associated with the flammable storage cabinets for each Unit. A full chemical vs. MSDS audit was not conducted during this evaluation. A spot check of chemicals showed labeling in compliance, with a few exceptions and a recommendation as noted above under Chemical Agents. Note: A new Hazard Communication rule was published by OSHA on March 26, 2012. This rule will require re-training of all workers by December 2013, notably for the new labeling and new Safety Data Sheets (SDSs) requirements which will replace the old MSDS system. It is recommended that a site-specific hazard communication written program be prepared or updated, including training elements, to comply with the new regulation. Since Guard members are charged with building cleaning, cleaning chemicals should be included in this training. (Ref. 20) **(RAC 4– Health (Hazard Communication))**
5. PPE (29 CFR 1910.132) - A site-specific written Personal Protective Equipment (PPE) Program was not provided. However, the safety manual dated 15 March 1996 does have elements of a general program that could be used by the Armory if hazard assessments were performed. While the Armory does not perform many tasks that would require PPE, the few tasks that may require PPE, namely the workers involved in supply and logistics and the cleaning crews, should be protected by conducting the required hazard assessments and training. Such activities should be documented. (Ref. 21) **(RAC 4 – Health (PPE))**
6. Other: The facility did have a copy of Army Regulation 385-10, dated 12 September 2008.

Indoor Air Quality

The indoor air quality (IAQ) carbon dioxide (CO_2) concentrations were above the recommended IAQ parameter in a few areas. The recommended maximum CO_2 concentration is 993 parts of chemical to million parts of air (ppm) (700 ppm greater than the outdoor background level) based on outdoor air levels of 293 ppm. Results can be found in Table D. High CO_2 concentrations indicate that there is not enough outside air entering the room for the population in the room. CO_2 concentrations ranged from 1060 ppm to 1355 ppm in the S-3 Section, and the

Family Assistance Offices Rooms 120, 130, and 123. (Ref. 6) **RAC 3 - Health (Indoor Air Quality).**

Carbon Monoxide (CO) was not identified during this survey.

The indoor air quality parameters temperature and relative humidity were within acceptable ranges in the Warwick Armory. Results can be found in Table D. Comfort guidelines would indicate that at 60% relative humidity, an operative temperature in the range of 72° F to 78° F would be acceptable for most individuals. At 50% relative humidity the acceptable operative temperature range would be 76° F to 83° F (Ref 35).

The outside temperature was 66° F and the relative humidity was 82%. The sky overcast and it was raining.

Table D – Indoor Air Quality Survey Results

Location of Measurement	**Temperature Degrees Fahrenheit °F**	**Relative Humidity Percent %**	**Carbon Dioxide ppm**	**Carbon Monoxide ppm**
Outside	66	82	293	0
Armory – Main Building				
Room 173 - Office	69	54	662	0
Room 168 - Office	68	61	486	0
Classroom NW – sectional classroom	68	63	561	0
Kitchen	69	64	607	0
Drill/Assembly Floor	72	66	574	0
Tactical Training Operations Center (TTOC)	72	43	632	0
Room 120 – Family Assist Office	75	55	1068	0
Room 130– Family Assist Office	76	53	1073	0
Room 123– Family Assist Office	76	54	1355	0
S-3 Section Room 110	73	53	1060	0
S-1 Section Room 118 MP	72	54	980	0
BDE Conference Room (1055)	71	54	503	0
Boiler Room	75	57	473	0
Armory – Supply Building				
Room 309 (Room 1007 on drawing)	74	66	329	0
43rd Supply Office	75	58	445	0
118th Supply Office	71	63	520	0
Gym	75	67	403	0
Maximum Acceptable Guideline Levels	72 – 78 @ 60% RH	≤ 60%	993	9

Shaded areas do not meet an indoor air quality parameter. The references for this are: The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Environmental Conditions for Human Occupancy – Standard 55-2010 and Ventilation for Acceptable Indoor Air Quality Standard 62.1 - 2010.

Other Issues
Housekeeping – Housekeeping was in good condition in most areas. The exception was a mechanical room on the West end of the Supply Building. The room could not be entered without climbing over miscellaneous materials and the fire extinguisher was inaccessible. Photo included in Appendix C. **RAC 3 - Safety – Housekeeping** The reference for this is the OSHA regulations at 29 CFR1910.22 and 1910.157(c). Ref. 15

Building Issues – It is estimated that this building was built in the late 1950s or early 1960s. The roof was replaced about 4 years ago. However, the roof still leaks in some spots. Buckets are in place to collect leakage in the rooms. Photos are presented in Appendix C. There have been no complaints of mold or indoor air quality complaints. Water intrusions are problematic for mold growth. In addition to possible health effects, water intrusions are also long term maintenance and possibly structural decay issues. Typically, it will be much less costly to prevent or fix any water intrusions as they occur, rather than letting the issue fester and provide an opportunity for mold growth followed by required remediation. It is recommended that those responsible for building maintenance within the RI guard management team conduct a thorough inspection of all water intrusions and take action to implement a quality and lasting repair and maintenance program. (Ref. 30) **RAC 3 - Health (Water Intrusions)**

Airport Noise: There was a minor complaint on airport noise. Several hangars and airport operations are directly across the street from the Armory.

Conclusion
The Armory in Warwick is a multi-use, multi-unit facility with a main Armory building and an additional storage building. Workers assigned to this building appeared to be safety conscious with no instances of risky behavior noted. It was a privilege to work with MSG Non-Responsive and his people.

A few issues of minor to moderate concern were identified. There was a 55-gallon drum of a chemical in the Storage Building Mechanical Room that could not be readily identified. After closer examination it appeared to contain a corrosive. The container would need to be labeled and if the chemical is a corrosive, an eyewash / drench shower would be required per regulations of the Occupational Safety & Health Administration (OSHA.) All five wipe samples for lead contamination were negative. All four samples for asbestos were negative. Lighting levels are generally acceptable for work performed, with four areas of low lighting identified. There are several confined spaces at the site. A procedure to assure adequate warning and safe entry by outside organizations should be prepared, including a list of spaces at the site, awareness training on hazards for the workers and application of warning signage. There was no site-specific written Hazard Communication Program. There was no site-specific Personal Protective Equipment (PPE) Program and a hazard assessment was not conducted. Analysis of site-specific hazards and controls is necessary to comply with regulations. There were a few areas of high carbon dioxide levels; this indicates inadequate outdoor air intake. While most housekeeping was acceptable, a hot water / mechanical room in the West end of the Supply Building was near impossible to enter and a fire extinguisher was blocked. The building roof leaks. The maintenance of the facility is shared by the RI Guard and its State agency partners. These water intrusions can lead to a host of health problems associated with mold growth and further

deterioration of the building structure. Therefore, it was recommended that these issues be addressed in a comprehensive fashion and that any future instances be addressed promptly.