



Infrastructure · Water · Environment · Buildings

ARCADIS  
295 Woodcliff Drive  
Third Floor  
Suite 301  
Fairport  
New York 14450  
Tel 585.385.0090  
Fax 585.385.4198  
[www.arcadis-us.com](http://www.arcadis-us.com)

Mr. Todd Caffoe  
Regional Hazardous Waste Remediation Engineer  
New York State Department of Environmental Conservation  
6274 Avon-Lima Road  
Avon, New York 14414-9519

Subject:  
Vapor Intrusion Investigation Work Plan  
Crosman Site  
East Bloomfield, New York

Date:  
December 30, 2013

Dear Mr. Caffoe:

Contact:  
William B. Popham

On behalf of Crosman Corporation and New Coleman Holdings, Inc. (Crosman), ARCADIS has prepared this *Vapor Intrusion Investigation Work Plan* (Work Plan) for the collection of sub-slab soil gas, ambient air, and indoor air samples at the Crosman plant located on Routes 5 and 20 in East Bloomfield, New York. This Work Plan has been prepared to address the New York State Department of Environmental Conservation's (NYSDEC's) request for a soil vapor intrusion evaluation, as detailed in its letter dated November 28, 2012, as well as subsequent communications between ARCADIS, the NYSDEC, and New York State Department of Health (NYSDOH), including a meeting in the NYSDOH's Albany offices on April, 23, 2013, a site walk with the NYSDEC and NYSDOH on October 22, 2013, and multiple telephone and email communications.

Phone:  
585.662.4022

Email:  
[bill.popham@arcadis-us.com](mailto:bill.popham@arcadis-us.com)

Our ref:  
B0041501.0001

As indicated within the Work Plan, ARCADIS is tentatively scheduled to implement the Work Plan in mid- to late January 2014. In an effort to maintain this schedule, review and approval of the Work Plan at your earliest convenience would be appreciated.

If you should have any questions, feel free to contact me at 585.662.4022.

Sincerely,

ARCADIS

William B. Popham  
Senior Vice President

Imagine the result

Copies:

Nate Freeman, New York State Department of Health  
Justin Deming, New York State Department of Health  
Bart Putzig, New York State Department of Environmental Conservation  
Keith Berger, Esq., New Coleman Holdings, Inc.  
Thomas F. Walsh, Esq., Hiscock & Barclay, LLP  
Gina Thomas, Crosman Corporation  
Aaron D. Richardson, ARCADIS

**New Coleman Holdings, Inc.**

**Vapor Intrusion Investigation Work  
Plan**

Crosman Corporation  
East Bloomfield, New York

December 2013



A handwritten signature in blue ink, appearing to read "Aaron Richardson".

---

Aaron Richardson  
Project Manager

A handwritten signature in blue ink, appearing to read "Nadine Weinberg".

---

Nadine Weinberg  
Principal Scientist

## Vapor Intrusion Investigation Work Plan

Crossman Corporation

Prepared for:  
New Coleman Holdings, Inc.

Prepared by:  
ARCADIS U.S., Inc.  
295 Woodcliff Drive, Suite 301  
Fairport, New York 14450  
Tel 585.385.0090  
Fax 585.385.4198

Our Ref.:  
B0041501.0001

Date:  
December 2013

*This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.*

<b>1. Introduction</b>	<b>1</b>
1.1 History and Background	1
<b>2. Vapor Intrusion Sampling</b>	<b>3</b>
2.1 Sample Locations	3
2.2 Sub-Slab Soil Gas Sampling Methodology	3
2.3 Indoor and Ambient Air Sampling Methodology	5
<b>3. Reporting and Schedule</b>	<b>6</b>
<b>4. References</b>	<b>8</b>
<b>Figure</b>	
1 Site Layout	

## **1. Introduction**

On behalf of Crosman Corporation and New Coleman Holdings, Inc. (Crosman), ARCADIS has prepared this *Vapor Intrusion Investigation Work Plan* (Work Plan) for the collection of paired sub-slab soil gas and indoor air samples at the Crosman plant located on Routes 5 and 20 in East Bloomfield, New York (Site). This Work Plan has been prepared to address the request of the New York State Department of Environmental Conservation (NYSDEC) for a soil vapor intrusion evaluation, as detailed in its letter dated November 28, 2012. Therefore, the objective of the soil vapor intrusion evaluation described in this Work Plan is to collect sub-slab soil gas, indoor air, and ambient air samples to evaluate the potential for vapor intrusion at the Site.

In response to the NYSDEC's November 28, 2012 request, ARCADIS has since met with representatives of the NYSDEC and the New York State Department of Health (NYSDOH) in the NYSDEC's Albany offices on April, 23, 2013 to discuss the specifics of the letter, completed a preliminary onsite assessment on July 18, 2013 (as documented in a letter report dated August 13, 2013), and conducted a site walk with the NYSDEC and NYSDOH on October 22, 2013.

During the October 22, 2013 site walk, ARCADIS, the NYSDEC, and NYSDOH reviewed the questionnaire and building inventory completed during the July 18, 2013 preliminary site walk, and after a complete facility tour, agreed that the questionnaire and building inventory completed on July 18, 2013 will be sufficient for a soil vapor intrusion sampling event during this 2013-2014 heating season. In addition, ARCADIS proposed in the course of the site walk, and the NYSDEC and NYSDOH concurred, that six paired samples be taken at the locations illustrated on Figure 1 during the soil vapor intrusion investigation.

### **1.1 History and Background**

The Crosman plant was constructed and operations were initiated in 1966, with subsequent plant expansions in 1969, 1983, and 1985. Operations at the plant have involved the manufacture of airguns, BBs, pellets, zinc-plated carbon dioxide cartridges, and rangefinders.

During the plant's past operation, steel, brass, aluminum, plastic, and wood were received in bar and round stock; machined by screw machines, lathes, grinders, and cutting devices; formed, punched, and slotted by punch presses; cleaned with a trichloroethene (TCE) degreasing agent; and finished by black oxidizing, painting, or staining. As a result, the manufacturing processes conducted at the plant generated the following waste streams in the past: spent TCE, oil, petroleum naphtha, paint and stain solvents, Freon, and non-hazardous iron hydroxide sludge. By phasing out certain processes and/or chemicals (i.e., TCE), many of these waste streams, including spent TCE, are no longer generated at the Site.



**Vapor Intrusion  
Investigation Work Plan**

Crosman Corporation

Previous investigations at the Site identified TCE in the soil and groundwater, which is believed to have been primarily the result of inadvertent releases from TCE storage tanks that have since been removed. As a result, the remedy for the Site involved, among other activities, the installation and operation of a soil vapor extraction system that removed TCE contamination from the soil and groundwater at the source area at the east end of the plant to the extent feasible. Historic groundwater monitoring has shown that pumping well PW-1 at the north end of the Site continues to be effective in maintaining hydraulic control of the contaminant plume, preventing TCE-containing groundwater from migrating offsite. A 2010 investigation conducted at the north end of the Site confirmed that soil vapor intrusion was not occurring at residential homes north (i.e., downgradient) of the Site.

## **2. Vapor Intrusion Sampling**

This section outlines the specific locations to be sampled and presents the methods for conducting soil vapor sampling activities.

### **2.1 Sample Locations**

A total of six paired sub-slab soil gas and indoor air samples will be collected from the locations shown on Figure 1. During the indoor air sample collection, one ambient air sample will be collected from a location immediately upwind of the building. The sample locations with which NYSDEC and NYSDOH concurred are as follows:

- *Western (corporate) Office Area* – At this location, the sub-slab sample will be collected from within a janitor’s closet, with the paired indoor air sample being collected from the adjacent main hallway.
- *Eastern (plant) Office Area located immediately north of the main assembly portion of the plant* – At this location, the sub-slab sample will be collected from within a closet in the locker room, while the paired indoor air sample will be collected from within an adjacent office.
- *Main Assembly Area* – Both the sub-slab and indoor air samples will be collected from a central location within this area. Due to the changing layout of the main Assembly Area, it was agreed that the exact location will be determined at the time of sampling.
- *Screw Machines* – Both the sub-slab and indoor air sample will be collected from an area immediately adjacent to the small office area.
- *Ammo Department* – Both the sub-slab and indoor air sample will be collected from an area immediately adjacent to the small office area.
- *Tool Crib/Secondary Assembly Area* – The location of the sub-slab and indoor air sample for this area will be determined at the time of sampling, pending the identification of potentially buried utilities in the area.

### **2.2 Sub-Slab Soil Gas Sampling Methodology**

Sub-slab soil gas samples will be collected from temporary soil gas sample points consistent with the NYSDOH’s Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated 2006 (VI Guidance) using the following procedures:

- All sample locations will be cleared for utilities.
- A hand-held hammer drill will be used to core a  $\frac{3}{8}$  inch hole through the concrete slab and advance approximately 3 inches into the sub-slab material to create an open cavity.
- New Teflon<sup>®</sup>-lined tubing will be inserted into the concrete slab at each sample location, approximately 1 inch above the sub-slab material.
- The tubing will be fixed to the surrounding concrete slab using inert clay or hydrated bentonite, after it is positioned at the desired depth. The clay or bentonite will provide an air-tight seal between the sample tubing and the concrete slab.
- Prior to sampling, the sample tubing will be purged of three volumes of air at approximately 100 milliliters per minute. Upon completion of the volume purge, ARCADIS will conduct a seal leak test using laboratory-grade helium on all sub-slab locations.
- Finally, an individually certified, pre-cleaned, and passivated 6-liter SUMMA<sup>®</sup> canister, with a minimum canister pressure of -28 inches of mercury (inHg), provided by an NYSDEC-certified laboratory, will be connected directly to the tubing. All connections in the SUMMA<sup>®</sup> canister sample train will be connected using Swagelok<sup>®</sup> air-tight fittings.
- The SUMMA<sup>®</sup> canister will be opened and the sample will be collected over approximately 24 hours using a flow controller pre-set by the analytical laboratory. Once the canister has reached approximately -6 inHg, the control valve will be shut and the sample prepped for shipment. All canisters will be labeled at the beginning of sample collection with location IDs and contact information. Locations will be cordoned off to clarify that the canister should remain undisturbed during sampling.
- Upon completion of sampling, core debris, tubing, and all sampling material will be removed and properly disposed. The drilled holes will be filled with hydraulic cement flush to the surface. The area will be swept clean of any sampling-related debris and returned to pre-sampling conditions.

Samples will be submitted under routine chain of custody protocols to an NYSDEC-certified laboratory for analysis of the compounds identified in Table 1 (as already approved by the NYSDEC and NYSDOH) in accordance with United States Environmental Protection Agency (USEPA) Method TO-15. The laboratory will provide full data deliverable packages in accordance with current NYSDEC requirements.

**Table 1  
List of Analytes**

1,1,1-Trichloroethane	Chlorobenzene
1,1-Dichloroethane	cis-1,2-Dichloroethene
1,1-Dichloroethene	Methylene Chloride
1,2-Dichloroethene (total)	Tetrachloroethene
1,1,1,2-Tetrachloroethane	Toluene
Acetone	Trichloroethene
Benzene	Vinyl Chloride
Bromoform	Xylenes (total)
Carbon Tetrachloride	

### 2.3 Indoor and Ambient Air Sampling Methodology

Each indoor air sample will be collected from a location adjacent to the paired sub-slab sampling point identified in Section 2.1, above, and approximately 4 to 5 feet above the slab surface. In addition, an ambient air sample will be collected from a location immediately upwind of the plant building to evaluate the potential for background sources of constituents. All sample collection activities will be conducted consistent with the VI Guidance using the following procedures:

- An individually certified, pre-cleaned, and passivated 6-liter SUMMA<sup>®</sup> canister provided by an NYSDEC-certified laboratory, with a minimum of -28 inHg of pressure, will be set on an elevated surface approximately 4 to 5 feet above the slab, representing an approximate breathing zone for a potential resident or worker.
- The SUMMA<sup>®</sup> canister will be opened and the sample will be collected over approximately 24 hours using a flow controller pre-set by the analytical laboratory. Once the canister has reached approximately -6 inHg, the control valve will be shut and sample prepped for shipment. All canisters will be labeled at the beginning of the sample collection period with location IDs and contact information. Locations will be coned off to clarify that the canister should remain undisturbed during sampling.

All samples will be submitted under routine chain of custody protocols to an NYSDEC-certified laboratory for analysis of the compounds identified in Table 1 in accordance with USEPA Method TO-15. The laboratory will provide full data deliverable packages in accordance with current NYSDEC requirements.

### **3. Reporting and Schedule**

Sampling has been targeted for mid- to late January 2014. But the exact time and date for the sampling will be scheduled upon approval of this Work Plan, subject to final approval by the Crosmen plant. The NYSDEC will be given approximately 14 days (i.e., 2 weeks) prior notice of the exact time and date of the sampling. During sampling, the field sampling team will record or document the following information:

- Floor plan sketches that include the floor layout with sample.
- Photographs of sample locations before sampling and after repair.
- Weather conditions (i.e., precipitation before or during the sampling event, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (i.e., heating system active and windows closed).
- Any pertinent observations, such as spills, floor stains, or odors.
- Sample and sample container identifications.
- Date and time of sample collection.
- Sub-slab soil gas purge volumes.
- Results of any field measurements.
- Vacuum of canisters before and after sample collection.
- Chain of custody protocols and records used to track samples from sampling point to analysis.
- Utilizing the building survey that was previously submitted, the area surrounding each sample point will be checked, and any relevant chemical products used or located near (approximately a 50-foot radius) to each of the sample points will be noted.

Following receipt of the laboratory analytical results, a summary report will be prepared for submittal to the NYSDEC and NYSDOH and will include:

- A summary of the sampling procedures.
- A summary of all sub-slab soil gas, indoor air, and ambient air results.

- A comparison of constituents detected in historical/existing groundwater samples (i.e., site-related constituents of concern) and sub-slab soil gas and indoor air.
- Evaluation of the potential for soil vapor intrusion in accordance with the VI Guidance.
- NYSDEC full deliverable packages of all laboratory data and supporting materials (including the electronic data deliverables).



**Vapor Intrusion  
Investigation Work Plan**

Crosman Corporation

**4. References**

New York State Department of Health. 2006. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York. New York State Department of Health, Bureau of Environmental Exposure Investigation. October.

**Figure**

