



# Through the cracks

Preventing vapor intrusion exposure in Wisconsin and keeping children and families safe

## Wisconsin Site Evaluation Program

Bureau of Environmental and Occupational Health | Department of Health Services  
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# INTRODUCTION

## Purpose

This document provides practical tools to prevent vapor intrusion exposure for people in your community. This proactive approach can raise awareness of this invisible health risk and offers simple, low-cost solutions to your city, its citizens, and developers working in your area.

## What is vapor intrusion?

When a commercial business or industrial site spills chemicals into the environment, some of them end up in the ground and can stay there for a long time. Certain types of chemicals, such as volatile organic compounds (VOCs), can turn into vapor. The vapor can move through soil and along underground utility lines to the foundation of a nearby building. When the vapor enters the building through cracks in the foundation or along utility lines, this is called **vapor intrusion**. Vapor intrusion can present health risks to building occupants who breathe in the chemical vapors.

### Radon vs. Chemical Vapors

Vapor intrusion is similar to the concept of radon gas entering homes. However, while radon gas occurs naturally in soil, vapor intrusion results from chemical contamination.

## Vapor intrusion and dry cleaners: the connection

### Contamination was common

Unfortunately, housekeeping practices in the past weren't what they are today. Businesses frequently spilled or dumped their cleaning solvents, which left contamination in the ground. Many of these past businesses were dry cleaners that operated in the mid-20th century. The chemicals that former dry cleaners often left behind are well documented and the health risks related to the resulting contamination are now better understood.

### Former dry cleaners remain hidden

While contamination is common on large industrial properties, these locations—unlike former dry cleaning sites—are usually known and regulatory processes are more likely in place to deal with the contamination. Former gas stations, for example, are often linked to petroleum contamination from leaking underground storage tanks, but these tanks are closely tracked by state regulatory agencies. In addition, petroleum-related compounds tend to break down in the environment faster than the solvents used in dry cleaning operations. Dry cleaners are unique in that they come and go from small commercial spaces over the decades and there may not be any obvious signs of the former operation or the long-lasting contamination they may have left behind.



### Did You Know?

Thousands of forgotten former dry cleaners are estimated to be in the state of Wisconsin.

### Contamination is near where people live

Dry cleaners are often next to or have been redeveloped into residential housing. They can also be a low-cost option for housing child care facilities. Whether residential or commercial, the owners and occupants of buildings near former dry cleaners are often unaware of the contamination left behind or the health risks it may present to them.

## Health effects associated with chemical vapor exposure

**Tetrachloroethylene** (commonly called **PCE** or **Perc**) is a manufactured chemical that is widely used in the dry-cleaning of fabrics, including clothes. PCE became the predominant dry cleaning chemical solvent used after 1930 and is still used today.

Because it can persist for decades in the environment, PCE from past spills is commonly found where dry cleaners formerly operated. Once in the ground, PCE can break down into **trichloroethylene** (or **TCE**). Both PCE and TCE produce invisible vapors that cannot be sensed by the nose, so contamination often remains undetected.

PCE and TCE can easily vaporize and move from the ground into the indoor air of a building, where occupants can breathe it in. Long-term exposure to high levels of PCE and TCE may adversely affect the blood; kidneys; liver; immune and nervous systems; and reproduction and development. Long-term exposure to TCE and PCE may increase the risk for certain cancers, including kidney cancer. Exposure to TCE has been linked to fetal heart defects in the first trimester of pregnancy, even at low levels.



### Focus on Younger Women

While exposure to TCE can affect everyone, prevention efforts focus on women of childbearing age due to the potential serious effects of TCE on the developing fetus.

### Why focus on prevention?

Cleanup of environmental contamination is preferred, but it is not always possible, can take a long time, and is costly. *Prevention* of vapor intrusion exposure can be done now to protect human health with minimal financial burden.

Cleanup of historical contamination can prevent vapor intrusion; but it is estimated that only 10 to 15 percent of the former dry cleaners have completed or are undergoing cleanup of their environmental contamination. While cleanup of contamination is preferred for the large number of remaining dry cleaners, it is important to consider the following:

- ▶ Most owners of former dry cleaners are gone, and properties are now owned by unsuspecting individuals or small businesses.
- ▶ If testing finds contamination, the current property owner must perform the environmental cleanup if the former owner of the dry cleaner is not financially able to or cannot be located.
- ▶ Environmental cleanups at former dry cleaners can be very costly and take a long time.

Because vapor intrusion exposure is a primary health concern and prevention can be accomplished voluntarily and relatively cheaply, this toolkit focuses on eliminating the potential for exposure to vapors.

### The Law in Wisconsin

Wisconsin Stat. § 292.11, the “spill law,” requires investigation and cleanup of hazardous substances discharged to the environment. The law requires that a spill of a hazardous substance be reported to the Department of Natural Resources (DNR) when there is evidence of a discharge.

Many historical spills are found by testing for chemical contamination in the ground. **If you test for and find contamination, it must be reported to DNR.**

Once a spill is reported to DNR, the law to investigate and clean up the environment is in effect.

## Three steps to prevent vapor intrusion exposure

The process consists of three steps: inventory, prioritization, and prevention. Below you will find an overview of each step, including several decision points that your team will need before proceeding with the project.

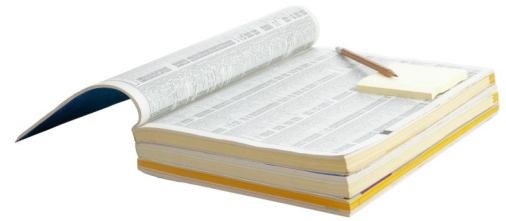
### 1 Create an Inventory

Collect historical records and record the address of former dry cleaners and related businesses in your community. At the end of this step you will have copies of the records used and a table summarizing:

- Business name and address.
- Type of business (e.g., dry cleaner vs. other types listed in Appendix).
- Years of operation.

#### Tip: Use phone books!

Old phone books are often the most useful resource for finding past businesses.



### 2 Screen and Prioritize

The properties in your inventory can be ranked to prioritize when and where vapor intrusion exposure prevention measures should be implemented. The ranking factors include:

- Likelihood for contamination (e.g., longer duration of operation = higher likelihood).
- Whether contamination has been cleaned up (e.g., cleaned up = lower vapor intrusion risk).
- Current land use near each former dry cleaner (e.g., childcare or residential property = higher priority).

### 3 Implement Prevention Measures

Take action to prevent vapor intrusion exposure in your community. Follow best practices for implementing prevention measures, such as:

- Installing a vapor mitigation system.
- Limiting uses of the building or nearby property to minimize harmful exposures (especially for vulnerable populations, such as young children and women of childbearing age).
- Following recommendations for construction in the right-of-way.



# Create an Inventory

## Summary

The process starts by reviewing old phone books and/or other historical records, copying (or scanning) key pages, and recording information about the former dry cleaners and related businesses. The goal is to create concise tables that summarize key information (for example, address, type of operation, years of operation). These tables will become the inventory for your community.

## Purpose

Historical businesses are often identified in old phone books and city directories. Information in this format can be disorganized and difficult to evaluate. Taking the time to assemble historical information into an electronic spreadsheet will provide you with a readily accessible inventory of potentially contaminated properties, which can be used now and in the future to address vapor intrusion in your community.



## Plan Ahead

### Estimated time

The time required will depend on the size of your municipality and ease of access to historical records. For example, approximately 80 hours were needed to complete the inventory of former dry cleaners for a mid-sized urban city in Wisconsin.

### Skills

Creating an inventory requires basic knowledge of a spreadsheet application such as Microsoft Excel, attention to detail, and the ability to understand the broad project objectives. In most cases, the work can be completed by an intern or entry-level staff person. However, some municipalities may choose to hire an environmental professional, especially if they choose to expand their inventory beyond former dry cleaners and related businesses.

### Materials

- Historical phonebooks
- Historical city directories
- Sanborn maps
- Scanner or scanning app on a mobile device
- A spreadsheet application (Microsoft Excel is recommended)
- Optional:** GIS and geocoding software (e.g., ArcGIS, QGIS, Centrus)

## Steps for Creating an Inventory

1. Define the scope of your inventory.
2. Collect and copy historical records.
3. Input data.
4. Clean up the data.
5. Map the data (optional).

## Inventory Steps

### 1. Define Scope

2. Collect and Copy Records

3. Input Data

4. Clean Data

5. Map Data (optional)

## 1. Define scope

The first step is to determine the scope of your inventory. The following information can help you select a smaller or larger scope, which will determine the size of your inventory and how much time commitment may be needed:

- **Business categories**
- **Geographical boundaries**
- **Years of information to gather and review**

Although you can always change these decisions during the project, determining the scope from the beginning will be more efficient. As you think through these decisions, it is important to weigh the pros and cons. Some municipalities may find a larger scope more useful, while others may wish to remain with a smaller scope due to capacity limitations.

A **smaller and focused scope** would focus on dry cleaners only, which are a primary concern for vapor intrusion risks. This scope will require less time and labor commitment, but will not offer the breadth of information that a larger and expanded scope will. Additional resources may be needed to repeat the inventory process if a business other than a former dry cleaner poses a vapor intrusion concern in the future.

A **larger and expanded scope** would focus on dry cleaners in addition to business categories listed in the Appendix. While expanding your scope will require a greater time and labor commitment, it may be more cost effective: you may not need to repeat your inventory process if a non-dry cleaner business poses a future concern.

### Determine Business Categories

Former dry cleaners are the focus of this toolkit because they are difficult to find and have long-lasting contamination with associated health effects. However, as noted in the section above, some municipalities may find it worthwhile, and have the capacity, to expand their inventory and catalogue other businesses with potential for contamination.

The following page contains a table that lists the dry cleaner categories recommended for a basic inventory targeted at former dry cleaners, as well as those categories recommended for an expanded inventory of potential dry cleaners. The table includes business types where dry cleaning on-site was likely (Dry Cleaners) and additional businesses where dry cleaning often isn't specifically mentioned but may have been performed (Potential Dry Cleaners). Contextual clues such as old ads, anecdotes, and interviews can help determine whether dry cleaning was performed at a particular location. Knowing if dry cleaning was performed on-site is important for evaluating whether historical contamination may be present at these properties.

### Want to expand your scope?

Former dry cleaners are the focus of this toolkit, but some municipalities may find it worthwhile to inventory other industries with potential for contamination. Assistance from an environmental professional is recommended for determining which other industries are worthwhile to include in your inventory. See the Appendix for a list of additional business types to consider in addition to dry cleaners.



## Inventory Steps

### 1. Define Scope

2. Collect and Copy Records

3. Input Data

4. Clean Data

5. Map Data (optional)

Category	Business Type	Phonebook Listing Headers
Dry Cleaners	Dry cleaner	Cleaner Fur Cleaning Cleaners- Self Service
Potential Dry Cleaners	Carpet or drapery cleaner	Automobile Upholstery Cleaning Carpet and Rug Cleaners Draperies and Curtains- Retail & Custom Made Drapery and Curtain Drapery and Curtain Cleaners Drapery and Curtain Fabrics Drapery and Curtain Fixtures Dyers Leather Cleaning
	Laundry	Laundries
	Tents and awnings	Awnings and Canopies Boat Covers, Tops, & Upholstery Tents-Renting
	Uniform service or rental	Bridal Gown Preservation Services Bridal Shops Formal Wear- Rental Linen Supply Service Uniform Supply Service

### **Tip: Be aware of discrepancies in your references**

The exact category names may be different in the phone books you choose to review and may differ between publication sources and years.

## Inventory Steps

### 1. Define Scope

2. Collect and Copy  
Records

3. Input Data

4. Clean Data

5. Map Data  
(optional)

## Set Year Range and Frequency

You should determine the years of data to collect prior to conducting the inventory. There are two decisions here: the range of years and the frequency of years to include. The more years you include the more detailed and accurate your inventory will be, but also the longer it will take to finish the inventory process.

**Range:** Obtain data for historical records from years 1930–2000. This is recommended based on the time period when PCE was used extensively in the dry cleaning industry and its release into the environment was common. Around 2000, some dry cleaners began to switch from using PCE for cleaning to using other compounds such as silicone, hydrocarbon, and carbon dioxide. While most dry cleaners today still use PCE, they use far less than they did in the past. You can collect information past 2000 if you choose.

**Frequency:** Beginning with the earliest year in your timeline, collect data from phone books and other sources every two to three years. Compared to collecting information for every year, this approach will significantly reduce time requirements while still providing a representative dataset of businesses in operation from 1930-1990.

### Tip: Prioritize the early years

If capacity constraints make it difficult to begin your inventory in 1930, start as early as you can post-1930 and work your way forward.

### Tip: Don't fret over missing information

If a certain year is not available (e.g., the phone book and city directory are missing for 1987), look for the next available year and continue the data collection process.

## Define Geographical Boundaries

Because phonebooks and city directories are geographically based, it is important to define the geographical boundaries of your inventory prior to collecting the data. For a municipality with consistent, defined borders, this may be a straightforward task. However, it may be less obvious for urban areas or cities that have grown over time (e.g. cities with annexations or other activity that have changed the municipal borders). For these situations, the inventory process may require review of historical phonebooks and directories from multiple cities.

## Inventory Steps

1. Define Scope

## 2. Collect and Copy Records

3. Input Data

4. Clean Data

5. Map Data  
(optional)

## 2. Collect and Copy Historical Records

After the scope is determined, you are ready to begin collecting data! The following section describes which sources to reference in order to collect the data, and how to store and organize the information you've gathered.

### Which records to search

**Historical phone books:** Historical phone books are the preferred data source because they are comprehensive, use relatively consistent categorization, and contain advertisements that can provide clues about business activities to help guide your search.

**City directories:** When historical phone books are not available for a given year, city directories are a good alternative, if available for that year.

**Sanborn Fire Insurance maps:** These are historical insurance maps which showed locations of certain businesses including cleaners and laundries.

**Other:** Other possible sources include city records such as boiler inspections, signage permits, health department complaints, building records, permits, etc. These can be more labor intensive to sift through, but could help clarify questions about a specific location.



### Sanborn Maps

Sometimes historical addresses in phone books and directories don't match up with today's addresses. Sanborn maps can be a useful resource for confirming locations of past businesses of interest. This Sanborn map from 1942 confirms that a rug cleaning business operated in the basement ("B.") of a building on Williamson Street in the City of Madison.

Sanborn Fire Insurance Map from Madison, Dane County, Wisconsin. Sanborn Map Company, Vol. 1, 1942. Map. Retrieved from the Library of Congress, <[www.loc.gov/item/sanborn09603\\_006/](http://www.loc.gov/item/sanborn09603_006/)>.

### Where to find records

**Wisconsin Historical Library** in Madison has a collection of historical phone books, city directories, and Sanborn maps for most municipalities in Wisconsin. While these documents are not available for interlibrary loan and cannot be checked out, they can be accessed for free.

**Historical societies** in metropolitan areas may have similar collections (e.g., Milwaukee County Historical Society: [www.milwaukeehistory.net](http://www.milwaukeehistory.net)).

**Local libraries** usually have a collection of historical phone books and city directories for your specific municipality. You may also want to check with nearby universities for similar resources.

**U.S. Library of Congress, EDR, ProQuest** and others have digital Sanborn maps available. While some are free to access, others are available for purchase.

**City or county government records** may contain city directories, permits, property tax documents, and other information that can be used to fill data gaps or confirm locations.

## Inventory Steps

1. Define Scope

### 2. Collect and Copy Records

3. Input Data

4. Clean Data

5. Map Data (optional)

## Scan and Copy Selected Data

Once a historical record (e.g., a phone book) is in hand, you will need to review the material and capture the pertinent information for your inventory.

1. Systematically review the record for each business type you selected to include during project scoping (refer to the table on page 9).
2. Scan and/or copy each page that contains listings under the business categories you selected. Remember to look for and scan or copy any ads for relevant businesses. Most importantly, ads for former dry cleaners can provide clues as to whether the cleaning, and thus the use of chemicals of concern, occurred on-site or at a different location.
3. Record the year and data source for each record that you have scanned or copied on the document itself. This will help you keep track of which records have already been scanned or copied. Including the year and data source on each scan or copy will also ensure that it can easily be traced to its original source.

Scanning or copying each page is recommended for two reasons. First, it is much more efficient to scan first and then complete data entry. Second, it is prudent to retain a copy of the original record in case you need to reference it in the future.

**2 HOUR "MASTERIZING" BEAUTIFUL DRY CLEANING**

**COUNTY WIDE**  
**Pick Up and Delivery**



**2 HOUR SERVICE**  
**DAILY and SATURDAYS**  
*At No Extra Charge*  
**PROFESSIONAL CLEANING SERVICE**  
**Alterations and Dyeing**

**Call 652-8354**

**RAMBLER DR. 3219 60TH ST.**  
**FREE PARKING IN REAR**

**Tip: Cleaners that advertised service in 4 hours or less are more likely to have cleaned on site.**

Some dry cleaners did not perform dry cleaning on-site, which means contamination is less likely at that location. Until the mid-1960s, dry cleaners sometimes operated a main plant where dry cleaning took place, as well as several "drop-off" locations where customers would drop off and pick up their clothing. Typically, dry cleaning did not occur at these drop-off locations. However, in some cases, dry cleaning later took place at former drop-off sites. Therefore, exercise caution when choosing to exclude businesses from your inventory. It's more prudent to include a business where on-site activities are uncertain and document the uncertainty, rather than to exclude it from the start.

## Inventory Steps

1. Define Scope
2. Collect and Copy Records
- 3. Input Data**
4. Clean Data
5. Map Data (optional)

### 3. Input Data from Records into a Spreadsheet

After you have copied or scanned the pertinent records, you are ready to enter the data into an electronic spreadsheet. You will enter data for each historical record that you collect. It is important to be as systematic as possible when entering information so that data are not missed or duplicated.

#### Components of Your Spreadsheet

To complete your inventory, we recommend collecting the following information for your spreadsheet. Further instructions and an example are included in the template file under the INSTRUCTIONS worksheet titled "1. INPUT DATA."

#### Tip: Use the template!

A template inventory is available on the [DHS vapor intrusion website](#) under "Resources for Environmental Professionals." This file contains detailed instructions and examples for building your inventory.

**REFERENCES:** Include a reference list on one tab in the electronic file that summarizes the records used for each year. (Use or refer to the REFERENCE worksheet in the template file.)

#### REFERENCES TEMPLATE

Enter the YEAR and REFERENCE INFO for each directory used in your inventory.

YEAR	REFERENCE
1933	Yellow pages phonebook for AnyTown, USA. 1933.
1935	Yellow pages phonebook for AnyTown, USA. 1935.

**ADDRESS:** Record business name, street number, street name, street type, and city for each listing.

- ▶ Number each line as you go so you can always re-sort back to the original order if needed.
- ▶ Use separate columns for the street number and street name to make sorting easier later on.
- ▶ Add a column for zip code if provided in the records used for your city.

ADDRESS					
#	BUSINESS NAME	STREET NUMBER	STREET NAME	STREET TYPE	CITY
1	Example Business A	1234	12TH AVE		ANYTOWN
2	Example Business B	567	MAIN ST		ANYTOWN
3	Example Business C	89	PARK BLVD		ANYTOWN
4	Example Business D	1234	12TH AVE		ANYTOWN
5	Example Business D	123	STATE ST		ANYTOWN
6	Example Business E	4567	STATE ST		ANYTOWN
7	Example Business F	89	STATE ST		ANYTOWN
8	Example Business F	1357	10TH AVE		ANYTOWN
9	Example Business H	2468	1ST AVE		ANYTOWN
10	Example Business I	10	2ND AVE		ANYTOWN

**CATEGORY:** Include the heading and any key notes from advertisements found in the phone book (or other directory), and then select a business type category.

Use the business types listed on Table 1 (e.g., Dry Cleaner or Potential Dry Cleaner) as the business type categories.

COPY	ANY KEY INFORMATION FROM ADVERTISEMENTS	PICK
		1 - DRY CLEANER OR 2 - POTENTIAL DRY CLEANER (See Inventory, Table 1)
PHONEBOOK LISTING		
DRY CLEANER		1 - DRY CLEANER
SELF-SERVICE CLEANER	Do your own dry cleaning on-site	1 - DRY CLEANER
FORMAL WARE RENTAL CLEANER		2 - POTENTIAL DRY CLEANER
DRAPERY CLEANER		2 - POTENTIAL DRY CLEANER
FORMAL WARE RENTAL		2 - POTENTIAL DRY CLEANER
DRY CLEANER		1 - DRY CLEANER
BRIDAL GOWN	Clean your wedding gown	2 - POTENTIAL DRY CLEANER
FUR CLEANER		1 - DRY CLEANER
DRY CLEANER		1 - DRY CLEANER

## Inventory Steps

1. Define Scope
2. Collect and Copy Records
- 3. Input Data**
4. Clean Data
5. Map Data (optional)

**YEAR:** Enter the year each time a business was listed in the historical record for that year.

- ▶ Enter in the year instead of a simple check box for each year business was found (see below). This will make calculations and future evaluations easier to apply to the data.
- ▶ Double check that you have entered a reference on the reference index for each year.

**YEARS OF OPERATION:** Use Excel functions to calculate the range of years and duration of time that each business was in operation.

- ▶ Use “min” and “max” functions in Excel to find the earliest and the latest year a business was identified in the historical records.
- ▶ Calculate the estimated time of operations based on the earliest and latest record.  
Estimated Time = Latest Record – Earliest Record +1.

#3: Enter the YEAR for each directory reviewed, and enter the YEAR in corresponding column each time a business was listed in a directory. (Insert or delete columns as needed between "START" and "END" to fit the number of years you reviewed in for your study).																				<b>** This calculates automatically **</b>				
YEAR																				OPERATIONS				
START	1950	1952	1954	1956	1958	1961	1962	1964	1966	1968	1971	1973	1974	1976	1978	1980	1982	1984	1986	END	EARLIEST RECORD	LATEST RECORD	ESTIMATED TIME (YRS)	
		1950		1954	1956	1958		1962															1950	1962
					1958	1961	1962		1966													1958	1966	9
									1966	1968	1971		1974		1976	1978		1982	1984	1986		1976	1986	11
																						1966	1974	9
	1952	1954	1956			1961																1952	1961	10
					1958		1962		1966		1971											1958	1966	14
									1966		1971		1974	1976	1978		1982	1984				1966	1984	19
								1964	1966													1964	1966	3
										1968	1971	1973										1968	1973	6
		1954		1958	1961		1964															1954	1964	11

▶ The template worksheet is set up to automatically calculate the earliest and latest record and estimated time of operations as you enter the data.

## Inventory Steps

1. Define Scope
2. Collect and Copy Records
3. Input Data
- 4. Clean Data**
5. Map Data (optional)

### 4. Clean the Data

The last step in developing an inventory is cleaning up and processing the data. This is an important step to correct errors and merge common address locations. Detailed instructions and examples of this process are included in the template file under the INSTRUCTIONS worksheet titled “2. CLEANUP.”

#### Save a Backup File

Before cleaning up the data, save a copy of your input data as a separate file, and work off that copy so that the original file is always available for reference and as a backup. The original file will be your raw data file.

#### Merge Common Locations

Business names can change over time. As such, there may be multiple businesses listed in your data with the same address. In this step, you will sort the entries by street number and street name to find entries that can be consolidated into one row. The purpose of this step is to link the time of operation for a business type to a physical location and not to a specific business name. This step will also help identify and combine duplicate listings for the same business that may have been entered on multiple rows during the initial data input.

- ▶ Select all the data and sort by Street Name and Street Number to find entries with the same address.
- ▶ Combine business with same address and category into one line:
  - ▶ Cut YEARS from one line and paste into the merged line.
  - ▶ When merging multiple business names into one line, we suggest entering a new name under Business Name (e.g. Raw Data Lines \_\_, \_\_, and \_\_.) This will save space and will make clear that the line is a merge from the original data.
  - ▶ If merging, use the most representative category as the entry for the combined line.
- ▶ Delete the empty cut lines after the years and other data have been merged into the combined line.

ADDRESS					
#	BUSINESS NAME	STREET NUMBER	STREET NAME	STREET TYPE	CITY
1	Example Business A	4567	STATE	AVE	ANYTOWN
2	Example Business B	2468	1ST	ST	ANYTOWN
3	Example Business C	1357	10TH	BLVD	ANYTOWN
4	Example Business D	1234	12TH	AVE	ANYTOWN
5	Example Business D	1234	12TH	AVE	ANYTOWN
6	Example Business E	567	MAIN	ST	ANYTOWN
7	Example Business F	123	STATE	ST	ANYTOWN

ADDRESS					
#	BUSINESS NAME	STREET NUMBER	STREET NAME	STREET TYPE	CITY
1	Raw Data Lines 1 and 4	1234	12TH	AVE	ANYTOWN
2	Example business B	567	MAIN	ST	ANYTOWN
3	Example Business C	89	PARK	BLVD	ANYTOWN
5	Example Business D	123	STATE	ST	ANYTOWN
6	Example Business E	4567	STATE	ST	ANYTOWN
7	Example Business F	89	STATE	ST	ANYTOWN

#### Same address, different categories?

If businesses share the same address but different categories, evaluate whether businesses are similar enough to merge or if they should remain distinct.

## Inventory Steps

1. Define Scope
2. Collect and Copy Records
3. Input Data
- 4. Clean Data**
5. Map Data (optional)

## Geocoding (optional)

Geocoding is an optional step where each location is assigned a coordinate point of latitude and longitude. This step is useful if you have a large dataset and plan to map your locations using geographic information system (GIS) applications such as ArcGIS or other geocoding software. It is also a good quality control measure because it will identify erroneous addresses and improve the accuracy of your data. For example, if there have been changes in street names or address numbering systems, geocoding will help identify these discrepancies so corrections can be made.

Geocoding software is available online or you can work with your GIS or mapping department, or an environmental consultant to assist you with geocoding your data. In general, geocoding will require you to:

- **Import the data into the software.** Import address data (address, street, city, state and zip code) into the selected software and request output in the format of decimal degrees.
- **Review the exported data points.** Review the coordinate points and any error codes exported by the software.
- **Correct errors.** Identify locations with any error codes that indicate an unrecognized or invalid address, and take steps to determine the correct current address by referencing Google Maps or historical city records. If the error cannot be corrected, then you may need to remove or flag that row in your inventory.
- **Add latitude and longitude points to inventory.** Insert the points of latitude and longitude in decimal degrees for each line item in the inventory spreadsheet.

ADDRESS						Optional Insert		
#	BUSINESS NAME	HOUSE NUMBER	STREET NAME	STREET TYPE	CITY	LATITUDE (DD, °N)	LONGITUDE (DD, °W)	PH
1	Raw Data Lines 1 and 4	1234	12TH	AVE	ANYTOWN	43.10939	89.41645	DRY
2	Example Buisness B	567	MAIN	ST	ANYTOWN	43.09111	89.46796	SELF
3	Example Buisness C	89	PARK	BLVD	ANYTOWN	43.07117	89.35932	FOR



## Inventory Steps

1. Define Scope
2. Collect and Copy Records
3. Tabulate Data
4. Clean Data
- 5. Map Data (optional)**

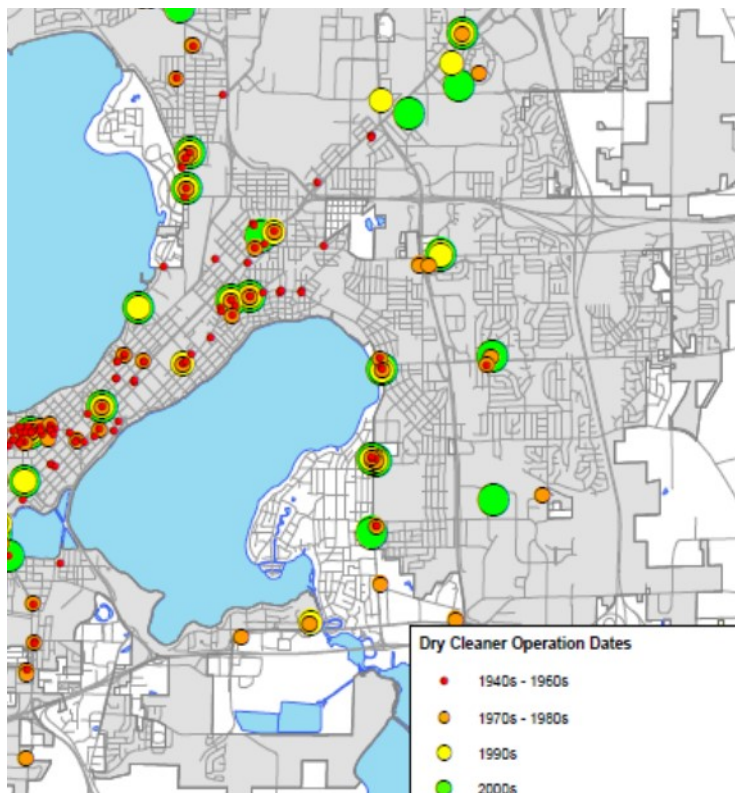
The potential contamination associated with former dry cleaners is not limited to current property boundaries. Mapping provides a better perspective on neighboring properties and areas with high density of former cleaners.

## 5. Map Data (recommended)

Mapping the locations in your inventory is an optional but recommended step. Mapping will help identify areas to focus on in the prioritization process (e.g., zones of town that contain a high density of former dry cleaners, or former dry cleaners that are near child care centers). Maps are also an efficient tool for quickly evaluating a property or areas of a town in the future (for example, is a redevelopment site for new residential housing near former dry cleaners?).

Mapping can be done by hand or with more sophisticated and powerful analytical software like ArcGIS.

- ▶ Larger to medium-sized municipalities may want to geocode and map their data using GIS. Consult with your local GIS department or an environmental consultant about preparing a GIS map and database from your inventory.
- ▶ Smaller municipalities may elect to map their data by hand or use GIS. For towns with very few sites and confidence in the address locations, mapping by hand may be more cost effective.



Mapping can simply focus on pinpointing each location. Additional color coding for each point based on category or years of operation may also be useful. For example:

- Years of operation (see example at left)
- Duration of time
- Dry Cleaner vs. Potential Dry Cleaner

*Example of a GIS map for the City of Madison that identifies the locations of former dry cleaner sites and distinguishes the points based on the dates of operation.*

*Map courtesy of the City of Madison Engineering Division*



# Screen and Prioritize

## Summary

This step will aid in prioritizing sites based on how likely they are to present health risks from vapor intrusion exposure. You will sort your inventory and rank them using criteria such as the time the business was in operation, distance to residential buildings, and whether the site has already undergone testing and cleanup of historical contamination.

## Purpose

Your inventory is an excellent tool for identifying locations of former dry cleaners. Unfortunately, the potential vapor intrusion risk is not equal at each location. In addition, the risk can extend beyond the business location as contamination often moves beyond the property boundary. Applying screening criteria to your inventory will help you prioritize specific buildings and broader areas where measures to prevent vapor intrusion exposure are needed most.

## Plan Ahead

### Estimated time

The time required will depend on the size of your municipality and ease of access to historical records. For smaller municipalities with very few sites, this work could be completed within a day. For larger ones with a large number of sites, the effort to sort and prioritize sites will take longer; however, this effort will pay off, because you will know where best to focus your resources to protect human health from potential exposure to vapor intrusion.

### Skills

An individual with a higher level knowledge of Microsoft Excel is recommended for sorting and analyzing the inventory. If you decide to map and analyze the inventory using GIS, then a GIS analyst is required to complete this work. Depending on the resources available in your municipality, this work could be done internally, or hired out to an environmental consultant who specializes in work on contaminated sites.

### Materials:

- Local zoning or land use maps
- Microsoft Excel
- GIS software package (optional)

## Steps for Screening and Prioritizing

1. Select prioritization criteria.
2. Research and input results.
3. Sort and prioritize inventory locations.
4. Map data (optional).

## Prioritizing Steps

### 1. Select criteria

2. Research results

3. Prioritize locations

4. Map data (optional)

## I. Select prioritization criteria

There are several criteria that can be used to sort and rank locations based on their potential vapor intrusion risk. You already recorded some of these criteria during the initial inventory, but other criteria require additional time and research.

We recommend using each of the criteria listed below, but you can revise to fit your needs. If you want to apply additional criteria, we recommend requesting assistance from an environmental consultant to help select and apply additional screening criteria to your inventory.

Criteria	Rationale
<b>Dry cleaner status</b> 1-Dry Cleaner or 2-Potential Dry Cleaner found in column I in Excel template	<b>Known dry cleaners present higher risks</b> Locations where dry cleaning was known to occur on-site are at higher risk for vapor intrusion than locations that could only be identified as potential cleaners.
<b>Years of operation</b> Estimated time found in column AG in Excel template	<b>Longer use could mean higher risk</b> Businesses that did dry cleaning for many years may have contributed harmful chemicals to the environment over a long period of time. However, dry cleaners that only operated for a short period of time may have contributed to significant environmental contamination as well.
<b>DNR designated site</b> Site is found within the DNR Bureau for Remediation and Redevelopment Tracking System (BRRTS) database*	<b>DNR designated sites may present lower risks</b> If a location in your inventory is listed in the DNR's BRRTS database, then potential vapor intrusion may have already been addressed. If so, then these locations are a lower priority for this project.
<b>Distance to residences, child care centers, or other buildings of concern</b> Identified through GIS or studying maps	<b>Former dry cleaners near (or converted to) residential or child care uses present higher risks</b> Vapor intrusion in homes or child care centers presents a higher risk because people, including families and small children, spend a lot of time breathing air in these spaces. Harmful vapors can move underground, affecting neighboring buildings. This means the potential risk from vapor intrusion is higher for a residence or child care center that is nearby or next door to a former dry cleaner, and is highest when the building itself was once the location of a dry cleaner.

**Already in your inventory!**

**Needs to be gathered**

**Look for vulnerable populations!**

Remember that women of childbearing age, infants, and young children are most vulnerable to the effects of vapor intrusion.

*\*DNR regulates the cleanup of known sites of environmental contamination and lists them as well as their cleanup progress in a publicly accessible database known as the [Bureau for Remediation and Redevelopment Tracking System \(BRRTS\)](#).*

## Prioritizing Steps

1. Select criteria

## 2. Research results

3. Prioritize locations

4. Map data (optional)

## 2. Research and input results

Additional work is needed to determine the distances between former dry cleaners and buildings where people live, work, and play, and whether the former dry cleaners are included in the DNR's BRRTS database of sites that have been evaluated for contamination.

### Distance to Buildings of Concern

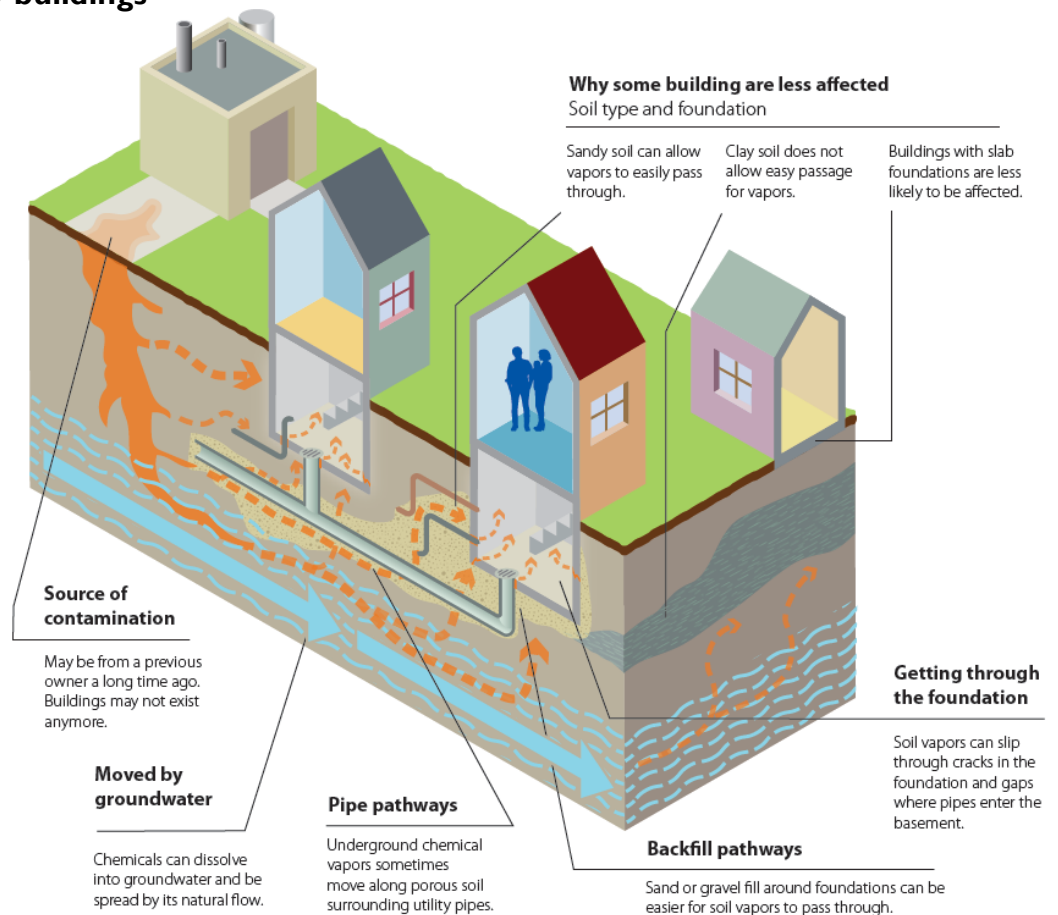
Vapor intrusion in places where people live, work, and play presents a higher risk because people, including families and small children, spend a lot of time breathing air in these spaces. Harmful vapors can move underground, affecting neighboring buildings. This means the potential risk from vapor intrusion is higher for a building that is nearby or next door to a former dry cleaner, and is highest when the building itself was once the location of a dry cleaner.

#### Look for buildings with vulnerable populations.

- ▶ Single family homes
- ▶ Multi-family housing or apartments
- ▶ Child care centers
- ▶ Schools
- ▶ Elder care or nursing facilities

Some of these may be occupied by especially vulnerable populations, including women of childbearing age, infants, and young children.

### Vapor intrusion can easily move to nearby buildings



Source: Minnesota Pollution Control Agency

## Prioritizing Steps

1. Select criteria

2. Research results

3. Prioritize locations

4. Map data (optional)

Distances between former dry cleaners and buildings of concern can be broken down into four risk categories. Locations within a 1/4-mile of the former dry cleaner are the focus.

Distance	Description	Risk Level
<b>0 feet</b>	The address of a current building matches that of a former dry cleaner (that is, the building was once a dry cleaner).	<b>Highest</b>
<b>0 feet to 300 feet</b>	Former dry cleaners that remain as commercial or industrial properties, but that are currently near residential buildings. For properties within 300 feet of a former dry cleaner, the potential for vapor to move through preferential pathways (such as sanitary sewer lines) is high.	<b>High</b>
<b>300 feet to 1,320 feet (0.25 miles)</b>	Within this range, the risk for vapor intrusion increases the closer the building of concern is to the former dry cleaner. Preferential pathways for vapor migration are also possible.	<b>Medium</b>
<b>Greater than 0.25 miles</b>	The former dry cleaner is in a commercial or industrial section of town and away from residences and other buildings of concern.	<b>Low</b>

These distance estimates do not have to be precise, but should help distinguish between the four categories listed above. The method you use to estimate distance will depend on the number of locations in your inventory and resources you have available. Some suggested methods and tools include:

### On-Line Aerial Photos (for example, using Google Maps or DNR's Sites Map)

- Input the address for a location in your inventory.
- Identify the nearest residential property or other building of concern from the address point.
- Measure and document the approximate distance.
- Do this for all locations in your inventory.

### Visit Locations In-person

- More efficient for smaller inventories
- Supplemental approach to verify current land use for a few locations

### GIS Analysis (optional)

- Use if your inventory has been mapped and you have assistance from a GIS analyst.
- Use layers available for your city on current land use (e.g., aerial photos, local zoning maps, tax parcel maps).
- Overlay land use with locations of former dry cleaner and measure distance to residential properties or other buildings of concern, or create buffer zones on a map.

After gathering this information, input these estimates into your inventory.

### Tip: Use DNR's map!

DNR's Remediation and Redevelopment program has a publicly accessible interactive map of known contamination sites in Wisconsin.

- ▶ Visit the [website](#).
- ▶ Select "Aerial Photo Layer."
- ▶ Input each property address.
- ▶ Use the "Measure Tool" to estimate the distance to the building(s) of concern.

## Prioritizing Steps

1. Select criteria

2. Research results

3. Prioritize locations

4. Map data (optional)

## DNR Designated Site

DNR regulates the cleanup of known sites of environmental contamination and lists them, as well as their cleanup progress, in a publicly accessible, online database known as the [Bureau for Remediation and Redevelopment Tracking System \(BRRTS\)](#). Beginning in 2010, prevention of vapor intrusion was required as part of DNR's cleanup process.

Cross-referencing your inventory with sites listed in BRRTS allows you to identify locations where vapor intrusion may have already been addressed.

BRRTS Site Status	Description	Relation to VI
<b>1 - Not listed or site closed (pre 2010)</b>	<p>Not listed in BRRTS: The DNR does not have record of environmental testing on the property.</p> <p>Closed (pre 2010): Contamination was found and cleaned up to the extent practicable, but because vapor intrusion was not well understood before 2010, the cleanup may not have addressed vapor intrusion.</p>	<b>Priority</b> The potential for vapor intrusion from historical contamination has not been addressed at these locations.
<b>2 - Open</b>	<p>Open: Contamination has been found at the property and the site is currently undergoing investigation and cleanup. State rules require the party responsible for the contamination to complete testing and cleanup, including measures to prevent vapor intrusion at properties affected by the contamination. However, redevelopment may need to occur before the site investigation and cleanup is complete.</p>	<b>Potential risk</b> Although potential vapor intrusion has been or will be addressed by the responsible party, you may wish to develop partnerships to inquire about or address potential risk.
<b>3 - Closed (post 2010)</b>	<p>Closed: Contamination was found and cleaned up to the extent practicable. Any sites that were closed after 2010 were required to prove that vapor intrusion was not a problem or take steps to prevent vapor intrusion on affected properties.</p>	<b>Lesser risk</b> Although vapor intrusion was assessed and possibly addressed, a risk could remain at some properties.
<b>4 - No Action Required</b>	<p>No action required: Testing was completed and there was no evidence of contamination discharged on the property.</p>	<b>Little to no risk</b> There is little to no risk of vapor intrusion when testing found no evidence of contamination on the property.

## Prioritizing Steps

1. Select criteria

## 2. Research results

3. Prioritize locations

4. Map data (optional)

## Navigating BRRTS

Access BRRTS by going to [dnr.wi.gov](http://dnr.wi.gov), searching “cleanup database” and clicking on “BRRTS on the Web.” Here you will also find instructions for how to search the database and points of contact for questions.

You will use a basic or advanced search to query the database and check if BRRTS includes locations from your inventory. Below are recommended searches; adjust the searches based on the size of your inventory and the time available.

### Address

Input the full street address and municipality for each location in your inventory.

- This is the most systematic search, but will take the most time.
- It is possible to miss a site in BRRTS if the street number is different between your inventory and BRRTS; this is a common issue for commercial or industrial buildings.

### Municipality and Street

Input the street name and municipality for locations in your inventory.

- This search is less likely to miss a commercial or industrial site in BRRTS because of differences in street number or address (e.g., Main St. vs. Hwy 2 or Cty Rd A).
- It requires that you cross-reference the query results with your inventory for each street that is searched.

### Municipality and Basic Keyword

Input municipality and enter “cleaner” in the activity name under Basic Search.

- This search narrows list to potential dry cleaners in your community.
- It is possible to miss locations if “cleaner” was not included in the activity or site name. It is common for DNR to name a site based on the business at the time of the notification. For example, the release from the former ABC Cleaners may be given the site name for the existing Jane Doe Nail Salon. In addition, some former dry cleaners also used the terms “cleaning” or “laundry” in their names; therefore, you should perform additional searches using those terms.

### Municipality and Advanced Keyword

Input municipality and select “Dry Cleaner” from drop down menu for Characteristics under Advanced Search.

- This search narrows list to potential dry cleaners in your community.
- It may miss a location if the location was not originally flagged as a dry cleaner in BRRTS.

### Municipality

- This search will capture all the sites in your community, which will prevent missing any locations.
- This can include thousands of sites, which will require sophisticated use of Excel, GIS, or other software to cross-reference the search results with your inventory.



## Prioritizing Steps

1. Select criteria
2. Research results
3. Prioritize locations
4. Map data (optional)

The results from a search of BRRTS (for municipality and basic keyword) might look something like the image below. These results include the BRRTS number and activity or site name; address; the site status (open, closed, etc.); and the date of closure (if the site was closed). This summary provides all you need for most situations; however, you can click on the Activity Name to obtain additional site details or a point of contact for more information.

After gathering this information, input the data into the Excel template.

### ENVIRONMENTAL CLEANUP & BROWNFIELDS REDEVELOPMENT BRRTS ON THE WEB

 >> SEARCH >> RESULTS

The results of your search below may not represent a complete list of all Locations and Activities in the State of Wisconsin with environmental contamination. There are locations that DNR has some information but no confirmation of a discharge to the environment. These potentially contaminated sites do not appear on BRRTS on the Web until contamination has been confirmed. In addition, the DNR may be unaware of contamination at some properties.

#### SEARCH RESULTS: 10 ACTIVITIES FOUND

HELP		DOWNLOAD			
Searched for: Name Contains CLEANER, Muni Contains GREEN BAY, Sorted by BRRTS No.					
BRRTS No. & Activity Name (Click to open Activity Details) Address, Municipality, County, Region	Type	Status	Juris	Start Date	End Date
<b>02-05-000203 UNIVERSITY CLEANERS</b> 1608 UNIVERSITY AVE, GREEN BAY BROWN NE	ERP	CLOSED	DNR	1984-12-26	1991-04-02
<b>02-05-233555 UNIVERSITY CLEANERS - 1608</b> 1608 UNIVERSITY AVE, GREEN BAY BROWN NE	ERP	CLOSED	DNR	1999-11-03	2017-01-24
<b>02-05-286542 HOLIDAY CLEANER INC</b> 701 13TH AVE (933 W MASON ST), GREEN BAY BROWN NE	ERP	CLOSED	DNR	2002-01-19	2014-04-23
<b>02-05-321297 UNIVERSITY CLEANERS - 1620</b> 1620 UNIVERSITY AVE, GREEN BAY CTY BROWN NE	ERP	CLOSED	DNR	2002-06-24	2013-05-28
<b>02-05-521419 ECONO-CARE CLEANERS (FORMER)</b> 719 S FISK ST, GREEN BAY BROWN NE	ERP	OPEN	DNR	2004-02-03	
<b>02-05-549808 ROYAL CLEANERS</b> 2201 UNIVERSITY AVE, GREEN BAY BROWN NE	ERP	CLOSED	DNR	2007-07-17	2017-12-22
<b>02-05-552220 TIDY CLEANERS &amp; LAUNDRY</b> 818 S BROADWAY, GREEN BAY BROWN NE	ERP	OPEN	DNR	2008-08-27	
<b>03-05-216499 UNIVERSITY CLEANERS (FORMER STANDARD STN)</b> 1608 UNIVERSITY AVE, GREEN BAY BROWN NE	LUST	CLOSED	DNR	1999-03-22	2003-02-26
<b>03-05-252737 VACUUM CLEANER SERVICE CENTER</b> 1200 E MASON, GREEN BAY BROWN NE	LUST	CLOSED	DNR	2000-04-13	2006-06-29

Download results into an Excel file

Site type Site status

Site or activity number and name

### ERP, LUST, and NAR... Oh, my!

Sites in BRRTS are grouped into several types. The most common ones include:

- ▶ Environmental Repair Program (ERP) sites (BRRTS # 02-xx-xxxxxx).
- ▶ Leaking Underground Storage Tanks (LUST) sites (BRRTS # 03-xx-xxxxxx).
- ▶ Spill sites (BRRTS # 04-xx-xxxxxx).
- ▶ No Action Required (NAR) sites (BRRTS #09-xx-xxxxxx).

The vast majority of former dry cleaner sites are ERP sites.

## Prioritizing Steps

1. Select criteria
2. Research results
- 3. Prioritize locations**
4. Map data (optional)

### 3. Sort and Prioritize Inventory Locations

Next, sort and prioritize the locations based on the likelihood of vapor intrusion and your need to act to prevent harmful exposures. Instructions on how to sort the inventory are included in the template file under the INSTRUCTIONS worksheet titled “3. Prioritize.”

Ranking and prioritization is intended to group locations together that highlight areas where action is needed most, and set aside locations where action is not needed. Below is a recommended sorting and prioritization structure that can be revised to meet your community’s needs.

#### Sort your inventory

##### I. DNR Status

A to Z



##### 2. Dry Cleaner vs Potential Cleaner

A to Z



##### 3. Distance to Residential Buildings

Smallest to Largest



##### 4. Estimated Years of Operations

Longest to Shortest

#### Prioritize\* your locations

Risk Level	Criteria	Priority Level
A - Likely or A - Very Likely	These locations are dry cleaner sites that are nearby residences or other buildings of concern and operated longer periods. A special category of <b>A - Very Likely</b> is recommended for locations where the distance from the former dry cleaner to the residential or other building of concern is 0 feet, indicating a converted dry cleaner and high risk for vapor intrusion.	<b>Highest</b>
B - Moderate	These locations are dry cleaners that are further distances from residences and/or operated only for a short period, and potential dry cleaners that are close to residences and operated for longer periods.	
C - Low	These locations are potential dry cleaners that are further from residences and/or that operated for short periods.	
D - DNR Site	These are locations where the vapor intrusion risk should be addressed by the party responsible for the contamination as part of an ongoing investigation and cleanup. However, pending redevelopment may elevate the priority since the investigation and cleanup effort is often over a long period of time.	<b>Lowest</b>

*\*Prioritizing sites may only be necessary if your community has a lot of sites to evaluate and assistance is needed to determine which ones to focus on first for implementing prevention measures. If your community has few dry cleaners, you may choose to treat them all as high priority. Ultimately, there is likely some risk of vapor intrusion at any site where dry cleaning took place.*

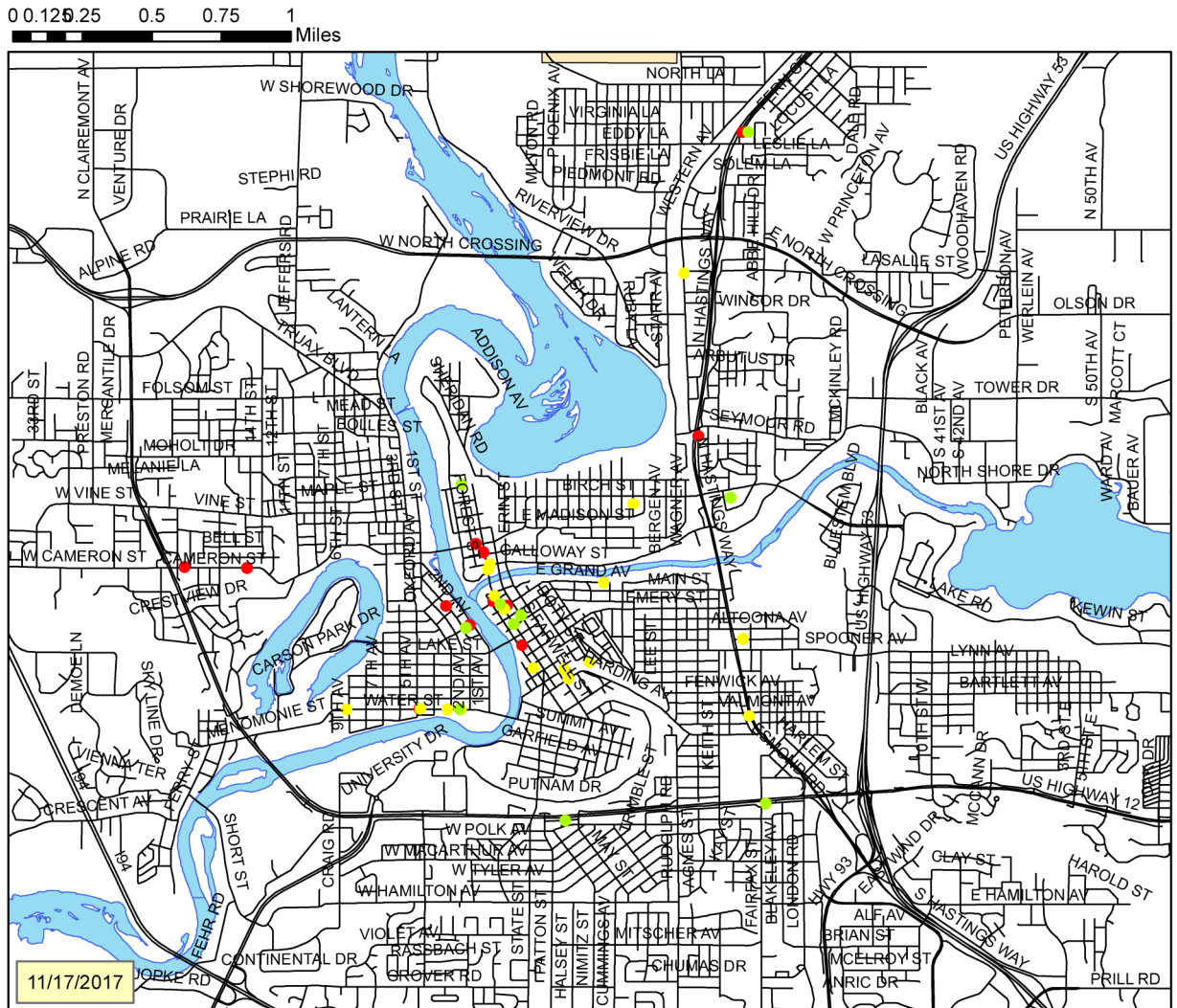
## Prioritizing Steps

1. Select criteria
2. Research results
3. Prioritize locations
4. Map data (optional)

## 4. Map Data (optional)

Similar to the inventory process, mapping is an optional step that could be worthwhile for cities with large inventories. The visual display will highlight broader zones within the city where action is most needed to prevent vapor intrusion exposure.

### City of Eau Claire, WI Dry Cleaner Locations 1908–1991



Map courtesy of the Eau Claire City-County Health Department



# Implement Prevention Measures

Once your inventory is complete and your locations are prioritized, you are ready to **take action!** This section highlights best practices for implementing measures to prevent exposure to vapor intrusion in your community.

## Implement Prevention Measures

This section lists actions that can be taken to reduce the likelihood of vapor intrusion into buildings and to facilitate proper handling of contaminated materials. First, identify the scenario that applies to your situation. Then, consider and review the available recommendations and resources.

### Scenario 1: Occupied building that was formerly a dry cleaner or near a former dry cleaner

#### Recommendations

- ▶ **Install a vapor mitigation system to limit chemical vapors from entering the building through the foundation.**

Contract with chemical vapor or radon mitigators certified by the NRPP. See the [DHS website](#) for a list of certified mitigators self-registered with DHS, or search for NRPP-certified mitigators in your state or area by visiting the [NRPP website](#).

- ▶ **Minimize the risk of vapors entering the building through the plumbing system by making sure all plumbing traps are functioning properly.**

Contact a licensed plumber. You can verify a plumber's credentials by visiting the Wisconsin Department of Safety and Professional Services' [website](#).

- ▶ **Consider limiting certain uses such as child care, residential, or as a workplace for women of child-bearing age due to an increased health risk.**

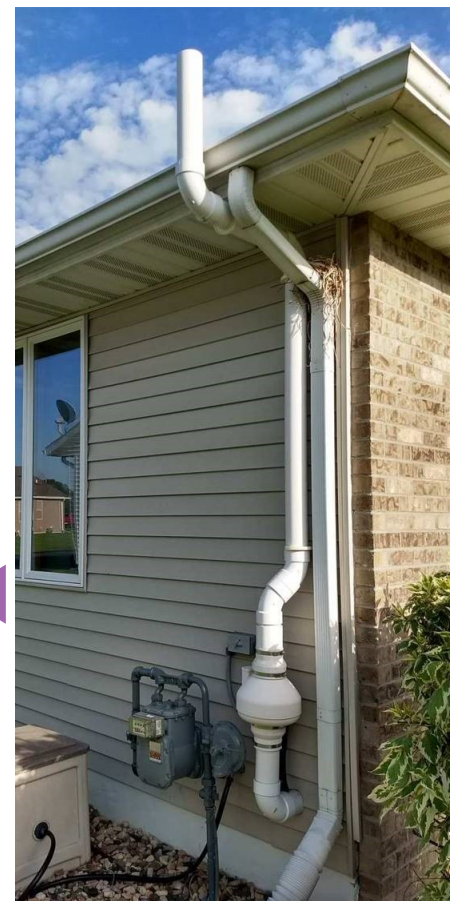
For additional guidance, contact DHS by phone (608-266-1120) or [email](#), or your local [health agency](#).

#### What does it mean to be certified by the National Radon Proficiency Program (NRPP)?

NRPP-certified mitigators have been trained and are required to follow industry standards developed by the American Association of Radon Scientists & Technologists (AARST), accredited by the American National Standards Institute (ANSI) in order to maintain their certification.

#### Vapor mitigation systems

A vapor mitigation system moves chemical vapors from below a building and releases them above the building. This prevents build-up of harmful vapors inside a building where occupants can become exposed.



## Scenario 2: New construction on a property that was formerly used by a dry cleaner or nearby a dry cleaner

### Recommendations

**Incorporate building features that limit vapors from entering the building through the foundation and sewer system.**

Contract with chemical vapor or radon mitigators certified by the NRPP. See the [DHS website](#) for a list of certified mitigators self-registered with DHS, or search for NRPP-certified mitigators in your state or area by visiting the [NRPP website](#).

## Scenario 3: Work in the right of way near a former dry cleaning operation

### Recommendations

**Sewer pipes, bedding materials, and surrounding soils are commonly contaminated around sanitary sewers and other utilities near former dry cleaners. Working in such a location will necessitate sampling and testing to properly manage excavated materials.**

Hire a qualified environmental professional. View this [DNR fact sheet](#) to learn more.

For detailed information regarding management of contaminated materials, visit [DNR's website](#).

### **To test, or not to test?**

Collecting and analyzing (testing) environmental samples for dry cleaning chemicals will give greater assurance that such measures are successful. For example, if a vapor mitigation system is installed, testing indoor air for dry cleaning chemicals afterwards can confirm if the system is protecting indoor air quality. However, if testing finds contamination, property owners are required under Wis. Admin. Code ch. NR 706 to provide the laboratory results to the DNR immediately upon receipt. The property owner may need to assume responsibility for the cleanup. For a detailed overview of what may be required, see DNR's fact sheet, [Environmental Contamination: The Basics](#).

## APPENDIX

### Additional Business Categories with Potential for Contamination and Risk for Vapor Intrusion

Municipalities should work with an environmental consultant to determine the specific list of additional businesses to include for your inventory. The list will vary based on your objectives for creating an expanded inventory and may include businesses not listed here.

Business Type	Phonebook Listing Headers
Gas station	Service Stations- Gasoline and Oil
Gas and oil	Gas-Liquefied Petroleum-Bottled & Bulk Gas & Oils Gasoline- Wholesale Oils- Diesel Oils- Fuel
Automotive repair shop	Automobile Parts & Supplies Automobile Renting & Leasing Automobile Repairing & Service Automobile Repairing & Service- Equipment & Supplies Automobile Seat Covers, Tops, & Upholstery Automobile Seat Covers, Tops, & Upholstery Materials & Equipment– Distributors & Manufacturers Automobile Transporters & Drive-Away Companies Truck Repairing & Service
Small engine repair	Boat Dealers Electric Motor-Dealers & Repairing Engines-Diesel Engines-Gasoline Lawn Mowers-Sharpending & Repairing Outboard Motors Radiators- Automotive Snow Removal Equipment
Foundry	Foundries
Metal work and plating	Machine Shop Metalizing Plating Scrap Metal Steel Fabricators
Funeral services	Funeral Directors Funeral Directors Equipment & Supplies
Coal or coke	Coal, Coke, and Wood
Appliance repair	Electric Appliances- Major