Environmental Health Education Initiative:
A Collaborative Effort

This is the first of seven newsletters that will be available every other month from January 2001 to January 2002. The Monroe County Health Department will address hazardous waste and health related topics relevant to the former 3M/Dynacolor site and the former G.E. and Black & Decker site located in the Village of Brockport.

Environmental Health: What is Exposure?

A Close Up Look At: Trichloroethylene (TCE)

Who to Contact for Site Information

This educational effort is the result of a grant project, for which the Monroe County Health Department (MCHD) received funding in June 2000 from the National Association of City and County Health Officials. Since June, the MCHD has been working with several community members, the Village of Brockport and Town of Clarkson governments, and state agencies to carry out this project. The membership of this consultation group includes Kathy Snyder, Ken Pike, John Lessord, Shawn Lessord, Louise Cardillo, Lynne Gardner, Mayor Mary Ann Thorpe, and Paul Kimball, Supervisor of Clarkson, as well as staff from county and state agencies.

The Village of Brockport was chosen for this grant project because of the high level of interest demonstrated by residents about the site activities at the 3M/Dynacolor and G.E. and Black & Decker sites, and the effect that the clean-up activities will have on the lives of residents. The MCHD decided that there was an interested audience that could benefit from additional environmental health education opportunities.
QUESTIONS & ANSWERS

What contaminants have been found at the former 3M/Dynacolor and former G.E. and Black & Decker sites?

Cyanide, lead, cadmium, silver, zinc, and a group of semi-volatile organic compounds (SVOCs) called polycyclic aromatic hydrocarbons (PAHs) have been detected in soils on the former 3M/Dynacolor site. These contaminants have also been detected in soil in the yard of the Scout cabin adjacent to 3M and in soil of residential properties west of 3M on Oxford Street.

Trichloroethylene (TCE), cis-1,2-dichloroethylene (a breakdown chemical of TCE), and other volatile organic compounds (VOCs) have been detected in a groundwater plume that has migrated from the former G.E. and Black & Decker site under the Erie Barge Canal and underneath the residential neighborhood north of the canal. These contaminants have been detected in the sump water and indoor air of some residences north of the canal on Lyman and Barry Streets.

Polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs), cyanide, silver, and zinc have been detected in stream sediment and surface soil samples along Tributary #3 of Brockport Creek. Samples were collected in the above ground or unpiped segments of the tributary between the storm sewer along State Street to the point where Tributary #3 and Brockport Creek meet in the Town of Clarkson.

What levels of these contaminants have been detected?

In this section, information is presented in tables containing the following categories: 1) the contaminants found at the site, 2) the range of levels detected, and 3) general clean-up guideline levels for soil or groundwater. The values for recommended soil clean-up objectives were obtained from the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM 4046). The groundwater quality standards were obtained from Section 703.5 of Title 6 of the Official Compilation of the Codes, Rules and Regulations of the State of New York (6 NYCRR). These objectives and standards are general guidelines that are used by the NYSDEC when establishing clean-up standards for a specific site. For each hazardous waste site, the NYSDEC establishes clean-up standards based on the conditions found at the site. These site-specific standards are negotiated with the potentially responsible parties (in this case 3M Corp., G.E. and Black & Decker) and are also presented to the public for their input. To date, the clean-up standards for the 3M site or the G.E. site have not been established. The clean-up values included in the tables are guidelines for use as a comparison to the existing levels at the sites.

TAGM 4046 and 6 NYCRR 703.5 do not provide a general clean-up guideline value for total cyanide or for the groups of semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) as a whole. There are general clean-up guideline values for the specific types of cyanide, as well as different SVOCs and VOCs. The laboratory tests conducted on samples indicated which different SVOCs and VOCs were present in elevated levels. However, these will be discussed in the following issues of the newsletter.

The laboratory tests, which were conducted to determine if cyanide was present, were unable to identify different forms of cyanide and only indicated that cyanide in general was present. Laboratory tests to identify specific forms of cyanide are not available at standard environmental laboratories. There are a few research laboratories that have the capability of conducting these tests. To date, no further laboratory tests have been conducted to identify the specific forms of cyanide present. It is known that a form of cyanide called Prussian Blue (Ferric Ferrocyanide) was used at the 3M site for pigment in photo processing. Historical documents show that thiocyanates were present in waste water at the facility at one time but no levels were recorded.

Table 1 lists the contaminants and the levels that have been detected in surface soil samples in the yard surrounding the Scout cabin and on residential properties along Oxford Street, which borders the northwest of the 3M site.

Background samples are samples that are collected in areas near a hazardous waste site but are believed to be unaffected by the site-related hazardous waste. These samples are taken to compare an area's prevailing conditions to the conditions at the site.

The contaminants are reported in parts per million (ppm). One ppm means that there is one part of a substance for every million parts of the air, water or soil in which it is measured. For example, 1 ppm is

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about one drop of dye in 18 gallons of water, about one inch in 16 miles, or one penny in $10,000.

There were six surface soil samples collected in the Scout cabin yard in May 1999. The detected levels are recorded on Table 1 as a range of levels. For example, the range for lead indicates that, of the six samples collected in the Scout yard and analyzed for lead, the lowest level detected was 103 ppm, the highest was 524 ppm, and the other four samples fell in between these levels.

There were fifteen surface soil samples collected from residential properties bordering the northwest of the 3M site. These samples were collected in June and July 1999. There were three background surface soil samples collected at the same time.

### Table 1 – Scout Yard/Oxford St. Soil Sample Results

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Scout Yard (ppm)</th>
<th>Residential Soil Samples (Oxford St.)</th>
<th>Background Samples (ppm)</th>
<th>NYSDEC Recommended Soil Clean-Up Objective (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>103 – 524</td>
<td>71 – 297</td>
<td>11 – 64</td>
<td>SB or *</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.8 – 1.1</td>
<td>0.38 – 1.40</td>
<td>0.1 – 0.3</td>
<td>1 or SB</td>
</tr>
<tr>
<td>Cyanide</td>
<td>ND – 155</td>
<td>ND – 23.9</td>
<td>ND</td>
<td>N-A</td>
</tr>
<tr>
<td>Silver</td>
<td>0.4 – 38.7</td>
<td>0.19 – 27.40</td>
<td>ND – 0.1</td>
<td>SB</td>
</tr>
<tr>
<td>Zinc</td>
<td>245 – 675</td>
<td>106 – 433</td>
<td>27 – 67</td>
<td>20 or SB</td>
</tr>
<tr>
<td>SVOCs</td>
<td>0.9 – 94</td>
<td>0.09 – 105.05</td>
<td>ND – 2</td>
<td>N-A</td>
</tr>
</tbody>
</table>

ND = Not Detected  
SB = Site Background  
N-A = Not available to date (see discussion on page 2)  
* = Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4 – 61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 – 500 ppm.

In addition to surface soil samples, groundwater samples were collected from residential monitoring wells located along Oxford Street in August 1999. Table 1A lists the contaminants and the levels (ppm) that have been detected in these samples, which were collected from six overburden monitoring wells. The soil that overlies bedrock is called overburden. The depth of the overburden changes with the topography of the land. Therefore, the six wells sampled in this area are at different depths. The shallowest well is 3.6 feet deep and the deepest overburden well is 14 feet.

### Table 1A – Oxford St. Overburden Well Sample Results

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Residential Groundwater Samples (ppm) (Oxford St.)</th>
<th>NYSDEC Water Quality Standards for Groundwater (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanide</td>
<td>ND – 0.452</td>
<td>0.200</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.0016 – 0.103</td>
<td>0.050</td>
</tr>
<tr>
<td>Copper</td>
<td>0.0031 – 16.2</td>
<td>0.200</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.0089 – 0.789</td>
<td>0.100</td>
</tr>
<tr>
<td>SVOCs</td>
<td>ND – 0.029</td>
<td>N-A</td>
</tr>
<tr>
<td>VOCs</td>
<td>ND – 1.982</td>
<td>N-A</td>
</tr>
</tbody>
</table>

ND = Not detected  
N-A = Not available to date (see discussion on page 2)

The contaminants detected in the groundwater are reported in parts per billion (ppb). One ppb means that there is one part of a substance for every billion parts of the air, water, or soil in which it is measured. One ppb is about one drop of dye in 18,000 gallons of water or about 1 second in 32 years.

### Table 2 – Lyman/Barry Sts. Overburden Well Sample Results

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Residential Monitoring Well Samples (ppm) (Lyman &amp; Barry Sts.)</th>
<th>NYSDEC Water Quality Standards for Groundwater (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichloroethylene</td>
<td>ND – 6.6</td>
<td>5</td>
</tr>
<tr>
<td>1,2-cis-dichloroethylene</td>
<td>ND – 95</td>
<td>5</td>
</tr>
<tr>
<td>Vinyl Chloride (VOC)</td>
<td>ND</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 3 lists the contaminants and the levels (ppm) that have been detected in five stream sediment and two surface soil samples collected from above ground or unpiped segments of Tributary #3 from the canal to just north of East Avenue. These samples were collected in November 1999.

Table 3 – Stream Sediment and Surface Soil Sample Results

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Stream Sediment Samples (ppm)</th>
<th>Surface Soil Samples along Stream (ppm)</th>
<th>Background Surface Soil Samples (ppm)</th>
<th>NYSDEC Recommended Soil Clean Up Objective (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PCBs</td>
<td>7 - 58</td>
<td>ND - 14</td>
<td>NA</td>
<td>1</td>
</tr>
<tr>
<td>Total SVOCs</td>
<td>7 - 101</td>
<td>0.3 - 35</td>
<td>ND - 2</td>
<td>N-A</td>
</tr>
<tr>
<td>Cyanide</td>
<td>0.08 - 23</td>
<td>0.6 - 123</td>
<td>ND</td>
<td>N-A</td>
</tr>
<tr>
<td>Silver</td>
<td>1 - 293</td>
<td>1 - 116</td>
<td>ND - 0.1</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>189 - 913</td>
<td>44 - 850</td>
<td>77 - 67</td>
<td>20 or SB</td>
</tr>
<tr>
<td>Nickel</td>
<td>9 - 105</td>
<td>10 - 41</td>
<td>7 - 11</td>
<td>13 or SB</td>
</tr>
</tbody>
</table>

NA = Not Analyzed
ND = Not Detected
SB = Site Background
N-A = Not available to date (see discussion on page 2)

What health risks are associated with the contaminants present at the detected levels?

The following paragraphs attempt to generally outline what health risks may be associated with the contaminants present at the detected levels in the areas where samples have been collected. However, it is important to understand that health effects of exposure to any hazardous substance depend on whether you have had contact with a chemical, the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present (see pg. 6 for discussion on exposure). In addition, most studies on chemical-related health effects are conducted using laboratory animals and not humans.

Scout Yard and Oxford St. Yards

There were some elevated levels of cadmium, silver, and zinc detected in surface soil samples collected in the yard surrounding the Scout cabin and on residential properties bordering the northwest of the 3M site. These chemicals were detected at levels that are not expected to result in adverse health effects.

Lead was also found at elevated levels in surface soil samples in this area. The range of lead detected in the Scout Yard was from 103 ppm – 524 ppm, and in the residential surface soil samples the range was 71 ppm – 297 ppm. According to the United States Environmental Protection Agency (USEPA), when lead levels equal to or exceeding 400 ppm are found in bare surface soils of residential property, child occupied facilities or in child play areas, a response action is advisable. Response actions such as changing use patterns or creating barriers between children and contaminated bare soil is recommended to reduce exposure. The USEPA defines a child as someone who is under 6 years of age.

Cyanide was also detected at elevated levels in some of the surface soil samples collected in the Scout yard and on residential properties bordering the northwest of the 3M site. It is known that a form of cyanide called Prussian Blue was used at the 3M site for pigment in photo processing. The levels of cyanide from Prussian Blue would not be expected to result in adverse health effects. However, as previously stated (pg. 2), it is not certain if other types of cyanide were also used at the site. Therefore, depending on the types of cyanide present, some of the levels in yard samples may pose a concern.

SVOCs found in surface soil samples are mostly a group of combustion by-products known as polycyclic aromatic hydrocarbons (PAHs). People may be exposed to PAHs in foods such as grilled meats or by breathing air emissions from vehicles or burning cigarettes. Long-term exposure to elevated levels of PAHs in soil may lead to a slightly increased lifetime cancer risk.

Lyman and Barry Sts. Overburden Wells

TCE and 1,2-cis-dichloroethylene were detected in the overburden monitoring well samples. TCE does not readily dissolve in water and it is heavier so that it tends to sink in water. It is unlikely that people outside the contamination plume would be exposed to TCE in the groundwater. Some residents within the area of the contamination plume have had levels of TCE detected in water in their basements. The level of groundwater changes, usually with the seasons, so that at times the water level rises high enough to seep into people’s basements. In addition, TCE may evaporate from sump water and in some residences TCE was detected at low levels in the indoor air. In these cases, with the permission of property owners, steps were taken to lessen the potential for exposure. The TCE levels detected in the indoor air of residences on Lyman Street are not expected to result in adverse health effects.
Tributary Sediment and Surface Soil

The New York State Department of Health clean-up goal for PCBs in residential surface soil is 1 ppm. The levels of the PCBs detected in the stream sediment and surface soil samples along the tributary are above this clean-up goal. Long-term exposure to elevated levels of PCBs in sediment and soil may lead to a slightly increased lifetime cancer risk.

The SVOCs detected in the sediment and surface soil samples along the stream are primarily PAHs. As previously stated, PAHs are a group of combustion by-products found in foods such as grilled meats and in air emissions from vehicles or burning cigarettes. Long-term exposure to elevated levels of PAHs in soil may lead to a slightly increased lifetime cancer risk.

The levels of silver, zinc and nickel detected in both sediment and soil samples were generally elevated in comparison to local background levels. However, contamination at these levels is not expected to result in adverse health effects.

Cyanide levels were elevated in some sediment and soil samples. As stated previously, it is not certain if other types of cyanide besides Prussian Blue were used at the 3M site. Therefore, the levels in the sediment and soil samples may pose a concern depending upon the type of cyanide present.

Have these contaminants affected our drinking water?

The area where the groundwater contamination is present in the Village of Brockport, is served by the county water system. The water that residents receive in their homes is filtered water from Lake Ontario. In addition, the water pipes are under pressure, which prevents groundwater from “seeping” into the pipes. The Village of Brockport Department of Public Works conducts leak detection tests semi-annually.

Have residents been notified that samples have been collected on their property?

Before any samples were collected from private properties, residents were contacted for their permission. In addition, representatives from the NYSDEC, New York State Department of Health and MCHD have met with residents to explain the laboratory results.

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How to minimize your exposure to these contaminants?

In order to be exposed you must have contact with the contaminants. This means you have to touch, breath or ingest a contaminant. During the time of year when the ground is snow-covered and frozen, exposure to contaminants in soil and sediment is usually minimal because people are not outside digging in the soil or playing near the creek.

You can reduce your exposure by avoiding the stream and areas that it floods. If you do come into contact with stream sediment or surface soil, rinse off any exposed clothing or body parts. If soil is tracked into the home, then cleaning floors with a damp mop is suggested to help reduce exposure to PCBs.

As a precautionary measure, the Monroe County Health Department recommends keeping children from playing in the stream and along its banks. In addition, children should not play in the Scout yard or dig in surface soils in the areas where contaminants have been detected.

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What is Exposure?

Exposure is contact. No matter how dangerous a substance or activity, without exposure, it cannot harm you. The following four ‘parts’ of exposure help explain how people are affected by chemicals and why some people may be more affected than others:

*Routes of Exposure* - Toxic substances can come into contact with or enter the body in three major ways: breathing, touching and swallowing.

Inhalation (breathing) of gases, vapors, dusts or mists is a common route of exposure. Chemicals can enter and irritate the nose, air passages and lungs. They can become deposited in the airways or be absorbed through the lungs into the bloodstream. The blood can then carry these substances to the rest of the body.

Direct contact (touching) with the skin or eyes is also a route of exposure. Some substances are absorbed through the skin and enter the bloodstream. Broken, cut or cracked skin will allow substances to enter the body more easily.

Ingestion (swallowing) of food, drink, or other substances is another route of exposure. Chemicals that get in or on food, cigarettes, utensils or hands can be swallowed. Children are at greater risk of ingesting substances found in dust or soil because they often put their fingers or other objects in their mouths. Lead in paint chips is an example. Substances can be absorbed into the blood and then transported to the rest of the body.

The route of exposure can determine whether or not a specific toxic substance has an effect. For example, breathing or swallowing lead can result in health effects, but touching lead is not usually harmful because lead is not absorbed particularly well through the skin.

*Amount of Exposure* - The amount of a substance that enters or contacts a person is called the dose. An important factor to consider in evaluating a dose is body weight. If a child is exposed to the same amount of chemical as an adult, the child (who weighs less) can be affected more than the adult. The greater the amount of a substance a person is exposed to, the likelihood increases that health effects will occur. Large amounts of a relatively harmless substance can be toxic. For example, two aspirin tablets can help to relieve a headache, but taking an entire bottle of aspirin can cause stomach pain, nausea, vomiting, headache, convulsions or death.

Length of Exposure – Short-term exposure is called **acute exposure**. Long-term exposure is called **chronic exposure**. Either may cause health effects that are immediate or health effects that occur days or years later.

Acute exposure is a short period of contact with a chemical. It may last a few seconds or a few hours. For example, it might take a few minutes to clean windows with ammonia, use nail polish remover or spray a can of paint. The fumes someone might inhale during these activities are examples of acute exposures.

Chronic exposure is continuous or repeated contact with a toxic substance over a long period of time (months or years). If a chemical is used every day on the job, the exposure would be chronic. Over time, some chemicals, such as PCBs and lead, can build up in the body and cause long-term health effects. Chronic exposures can also occur at home. Some chemicals in household furniture, carpeting or cleaners can be sources of chronic exposure.

**Sensitivity** – All people are not equally sensitive to chemicals, and are not affected by them in the same way. There are many reasons for this such as genetic differences and allergic reactions. People’s bodies vary in their ability to absorb and break down or eliminate certain chemicals due to genetic differences. People may become allergic to a chemical after being exposed. Then they may react to very low levels of the chemical and have different or more serious health effects than nonallergic people exposed to the same amount. People who are allergic to bee venom, for example, have a more serious reaction to a bee sting than people who are not allergic.

Factors such as age, illness, diet, alcohol use, pregnancy and medical and nonmedical drug use can also affect a person’s sensitivity to a chemical. Young children are often more sensitive to chemicals for a number of reasons. Their bodies are still developing and they cannot get rid of some chemicals as well as adults. Also, children absorb greater amounts of some chemicals (such as lead) into their blood than adults.

(Information courtesy of the New York State Department of Health)
Can TCE Cause Cancer?
There have been studies conducted to discover if TCE causes cancer in humans. Some studies found evidence that people who were exposed to high levels of TCE in the workplace for long periods had an increased rate of cancer. However, these results are inconclusive because other chemicals could have caused the cancer. The International Agency for Research on Cancer has determined that TCE is not classifiable as to human carcinogenicity.

Determining If You Have Been Exposed
Recent exposure to TCE can be detected in your breath, blood or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of TCE. Exposure to larger amounts is assessed by blood and urine tests, which can detect TCE and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to TCE. This test is not available at most doctors’ offices, but can be done at special laboratories that have the right equipment.

Health Effects
Breathing large amounts of trichloroethylene may cause impaired heart function, coma, and death. Breathing it for long periods may cause nerve, lung, kidney, and liver damage. Breathing small amounts for short periods of time may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Drinking large amounts of TCE for long periods may cause liver and kidney damage, nervous system effects, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with TCE for short periods may cause skin rashes.

Concentrations of TCE found in the indoor air of the residences on Lyman Street should not result in these short-term effects. It is not expected that any short-term effects would be observed. The only effects that may potentially be observed would be long-term effects.

- Monroe County Health Department

Information Sources
More on TCE

Websites
1) Environmental Protection Agency
   http://www.epa.gov/ogwdw/dwh/t-voc/trichlor.html
2) Agency for Toxic Substances & Disease Registry
3) Canadian Centre for Occupational Health & Safety
   www.ccohs.ca/oshanswers/chemicals/chem_profile
   s/trichloroethylene/trichloroethylene.htm
What's New

The New York State Department of Environmental Conservation continues their investigation for the source of the polychlorinated biphenyls (PCBs) found in Tributary #3 of Brockport Creek. To date, samples of sediment and soil along the tributary have been collected between the storm sewer along State Street to the confluence of Tributary #3 and Brockport Creek in the Town of Clarkson. The stream clean up will take place after the source of the PCBs has been identified because there is potential to recontaminate the stream if clean up occurs prior to locating this source. In October, 54 truckloads of blue soil (soil contaminated with cyanide) were removed under the parking lot north of the Agri Link building by the 3M Corporation. Barr Engineering, 3M’s environmental consultant, conducted indoor air testing for volatile organic compounds (VOCs) in residences along Oxford Street.

At the request of the Village of Brockport, the New York State Department of Health in conjunction with the Agency for Toxic Substances and Disease Registry (ATSDR) is preparing a Health Consultation. This report will outline the existing conditions surrounding the former 3M and G.E. sites, the potential health issues and the potential exposure of residents from contaminants present.

Who to Contact for Site Information

NYSDEC
- Kelly Cloyd, Ph.D., Project Manager for 3M site
  (716) 226-5351
- Larry Thomas, Project Manager for G.E. site
  (518) 457-9253
- Linda Vera, Citizen Participation Specialist
  (716) 226-5324

NYSDOH
- Steve Shost, Research Scientist
  1-800-458-1158 ext. 27860
- Mark Van Deusen, Outreach Coordinator
  1-800-458-1158 ext. 27830

Monroe County Health Department
- Joe Albert, Senior Sanitarian
  (716) 274-6904

Neighborhood Contacts
- Kathy Snyder (716) 637-7391
- John Lessord (716) 637-5580
- Lynne Gardner (716) 637-4803
- Shawn Lessord (716) 637-4068
- Louise Cardillo (716) 624-8392
- Ken Pike (716) 395-9080

Glossary of Terms

Contaminant – any substance that enters a system (the environment, human body) and is not normally found. Contaminants are usually referred to in a “negative” sense such as substances that spoil food or pollute the environment.

Detection limit – The amount of substance that a laboratory can reliably measure in a sample of air, water, soil or other medium.

Organic – Originally coming from plants or animals, and made primarily of carbon and hydrogen. Organic chemicals are a class of chemical compounds.

Plume – an area of chemicals moving away from its source in a long band or column. A plume, for example, can be a column of smoke from a chimney or chemicals moving with groundwater.

Volatile Organic Compound (VOC) – An organic chemical that evaporates easily. Petroleum products such as kerosene, gasoline and mineral spirits contain VOCs. Chlorinated solvents such as those used by dry cleaners or contained in paint strippers are also VOCs.

Volatility – The measure of how quickly a substance evaporates at ordinary temperatures. The air concentration of a highly volatile chemical can increase quickly in a closed room.

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