MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Agenda

- 6:00 – 6:05 p.m. Introductions and Overview
- 6:05 – 6:25 p.m. Presentation
- 6:25 – 7:00 p.m. Question and Answer Forum

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Agenda

- 7:30 – 7:35 p.m. Introductions and Overview
- 7:35 – 7:55 p.m. Presentation
- 7:55 – 8:30 p.m. Question and Answer Forum

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What is Superfund?

- Congress established the Comprehensive Environmental Response, Compensation, and Liability Act of 1980
- Gave EPA authority to clean up abandoned or uncontrolled hazardous waste sites
- Established funding to pay for cleanups when no viable responsible party found

In response to such major hazardous waste sites as Love Canal and Valley of the Drums, that received national public attention, Congress established the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in 1980. This gave EPA authority to clean up abandoned or uncontrolled hazardous waste sites. It established funding, that was nicknamed the Superfund, to pay for cleanups when no responsible party is found. A responsible party (or PRP) is defined as someone who owned or operated a facility during the time of a release.

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Superfund Goals

- Investigate releases of hazardous substances
- Respond to exposure risk
- Require responsible parties to clean up contaminated sites
- Oversee cleanup work

Our overall goal at the Department of Natural Resources is to protect human health and the environment. The Department's Superfund program receives funding from EPA to investigate sites. Our primary goal is to respond to exposure to hazardous substances above a level of health concern. We require responsible parties to cleanup contaminated sites and oversee that cleanup work.

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Cooperative Program Process

- Full site characterization
- Respond to immediate exposure concerns
- Evaluate long-term cleanup options
- Select and design remedy (solution)
- Implement cleanup actions
- Long term monitoring if necessary
- Property use restrictions if necessary

Through participation in our Cooperative Program work is required and conducted under a legal order with department oversight. Once the full extent of contamination is determined through thorough sampling of soil, soil gas, groundwater, and indoor air, we respond to immediate and long term exposure issues through a variety of potential cleanup actions which have included mitigation systems on buildings or installation of vapor barriers in addition to cleaning up the source of the contamination which has included removal or treatment of contaminated soil and or groundwater.

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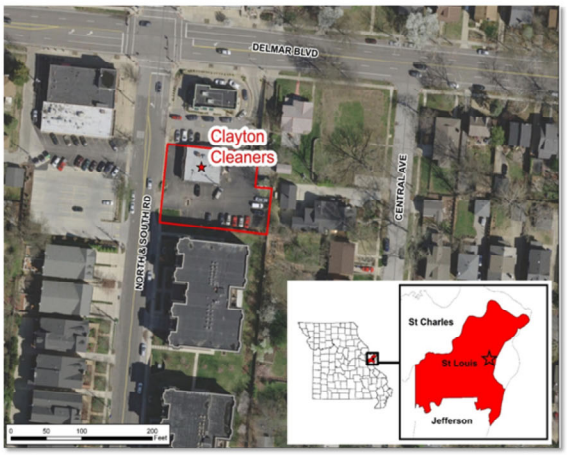
Clayton Cleaners Site

550 North and South Road



The Clayton Cleaners site has been an active dry cleaning business since 1939, with the exception of 1953 to 1968 when a beauty salon occupied the building. Clayton Cleaners has been in operation since 1988. Perchloroethene or tetrachloroethene (PCE) was used during dry cleaning operations at this site until April 2012 when the owner switched to a non-chlorinated solvent. We do not know what solvent was used by previous operators at the site.

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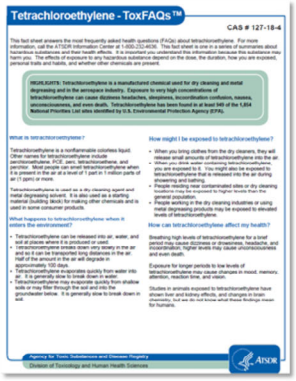
What is Tetrachloroethene (PCE)?

- Man-made chemical, colorless liquid
- Cleaner and degreaser
- Volatile organic compound evaporates easily into air
- EPA has classified PCE as a likely human carcinogen



Tetrachloroethylene - ToxFAQs™

CAS # 127-18-4

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing and in the aerospace industry. Exposure to very high concentrations of tetrachloroethylene can cause dizziness headaches, sleepiness, incoordination confusion, nausea, unconsciousness, and even death. Tetrachloroethylene has been found in at least 949 of the 1,854 National Priorities List sites identified by U.S. Environmental Protection Agency (EPA).

What is tetrachloroethylene?

Tetrachloroethylene is a nonflammable colorless liquid. Other names for tetrachloroethylene include perchloroethylene, PCE, perc, tetrachloroethene, and perchlor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part in 1 million parts of air (1 ppm) or more.

Tetrachloroethylene is used as a dry cleaning agent and metal degreasing solvent. It is also used as a starting material (building block) for making other chemicals and is used in some consumer products.

What happens to tetrachloroethylene when it enters the environment?

- Tetrachloroethylene can be released into air, water, and soil at places where it is produced or used.
- Tetrachloroethylene breaks down very slowly in the air and so it can be transported long distances in the air. Half of the amount in the air will degrade in approximately 100 days.
- Tetrachloroethylene evaporates quickly from water into the air. It does not dissolve easily in water.
- Tetrachloroethylene may evaporate quickly from shallow soils or may filter through the soil and into the groundwater below. It is generally slow to break down in soil.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it. You might also be exposed to tetrachloroethylene that is released into the air during showering or bathing.
- People living near contaminated sites or dry cleaning locations may be exposed to higher levels than the general population.
- People working in the dry cleaning industries or using metal degreasing products may be exposed to elevated levels of tetrachloroethylene.

How can tetrachloroethylene affect my health?

Breathing high levels of tetrachloroethylene for a brief period may cause dizziness or drowsiness, headache, and poor coordination. Very high levels may cause unconsciousness and even death.

Exposure for longer periods to low levels of tetrachloroethylene may cause changes in mood, memory, attention, reaction time, and vision.

Studies in animals exposed to tetrachloroethylene have shown liver and kidney effects, and changes in brain chemistry, but we do not know what these findings mean for humans.

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences

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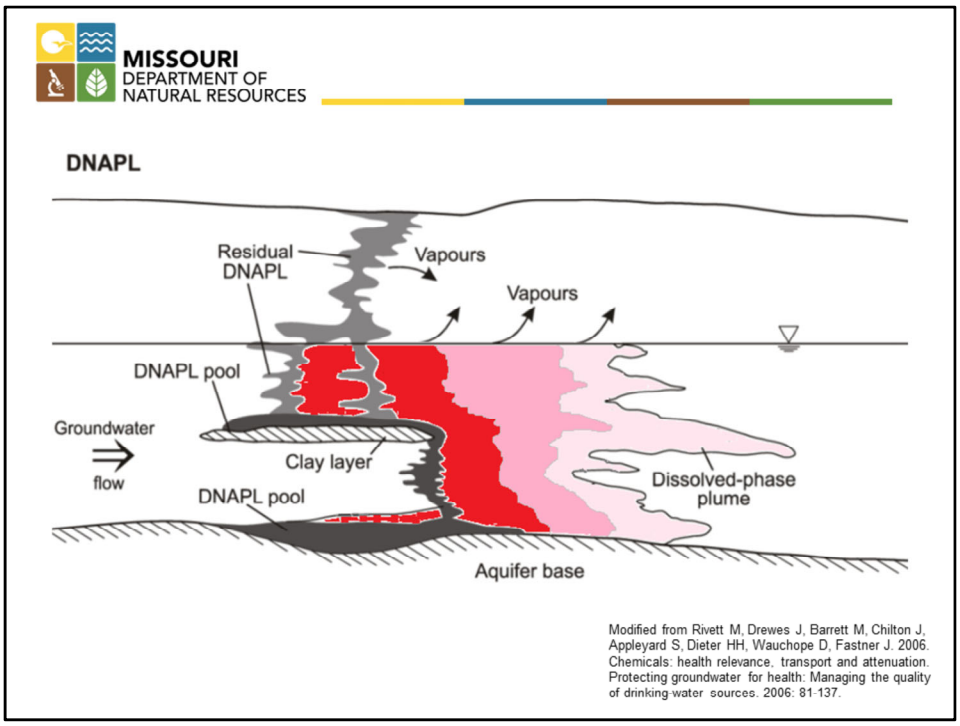
PCE breakdown

trans-1,2-DCE

PCE → *TCE* → *cis-1,2-DCE* → *Vinyl chloride*

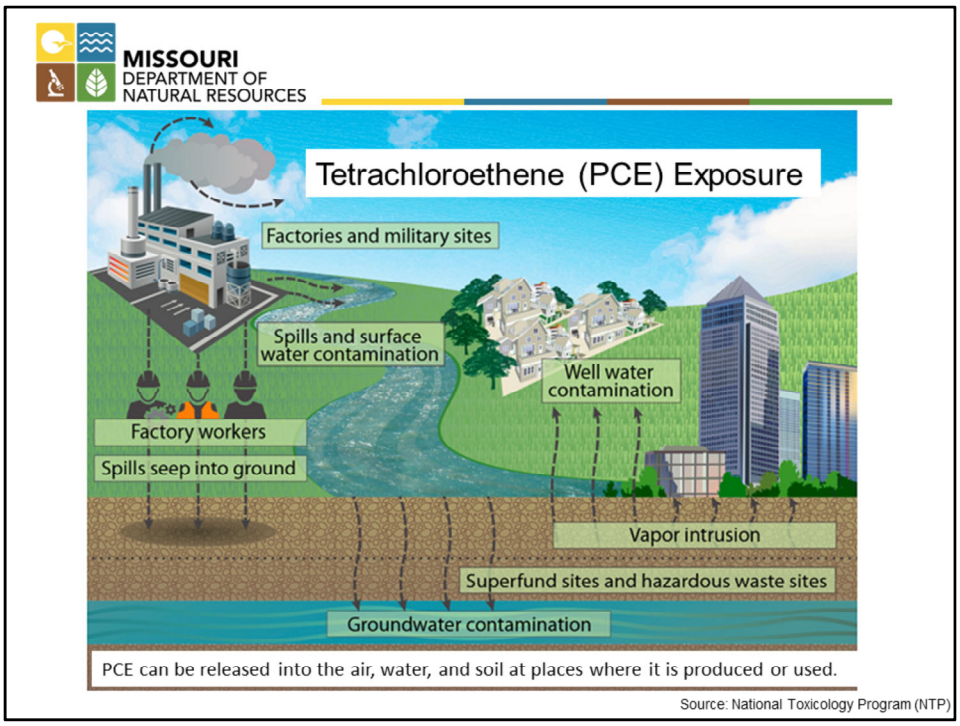
1,1-DCE



PCE and other chlorinated solvents are dense non-aqueous phase liquids (DNAPL). This means they are heavier than water and not very soluble in water. One gallon of PCE needs roughly 5,400 gallons of water to fully dissolve, and it's a very slowly process.

DNAPL pool = all voids in soil or rock are filled with DNAPL. Sinks through water like a feather in air.
Residual DNAPL = voids in soil or rock are ***partly*** filled with DNAPL.
Dissolved-phase plume = dissolved DNAPL drifts with groundwater flow, diluting with distance from source by mixing with water.

DNAPL and Dissolved plume will move faster in more open soils and rocks (higher permeability zones) like sand and karst bedrock. Clay and shale slow the plume. Clayton Cleaners site is underlain by clayey soils and shale bedrock.



This conceptual model shows how PCE might be released and migrate through the environment. Exposure pathways we investigate include the groundwater migration/drinking water pathway, surface water migration pathway, soil exposure and subsurface intrusion (vapor intrusion) pathway, and air migration pathway.

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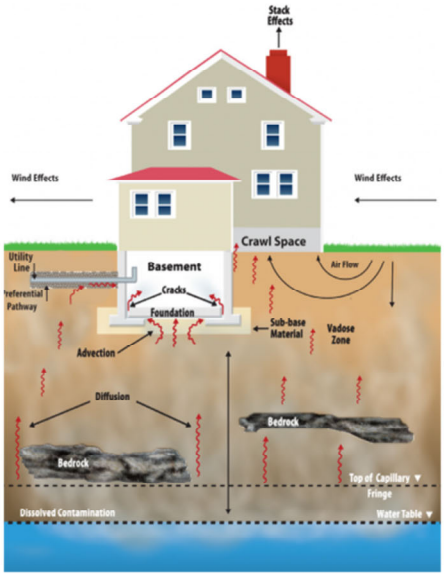
Vapor Intrusion

- Groundwater/soil gas
- Not all exposures cause harmful effects
- Mitigation systems



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Determining Response Actions for Vapor Intrusion Investigations

- EPA Vapor Intrusion Screening Levels (VISLs)
  - Indicate that potential for vapor intrusion exists and further sampling is warranted
- Action levels
  - Indicate that actions to mitigate risk are warranted

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Clayton Cleaners Site

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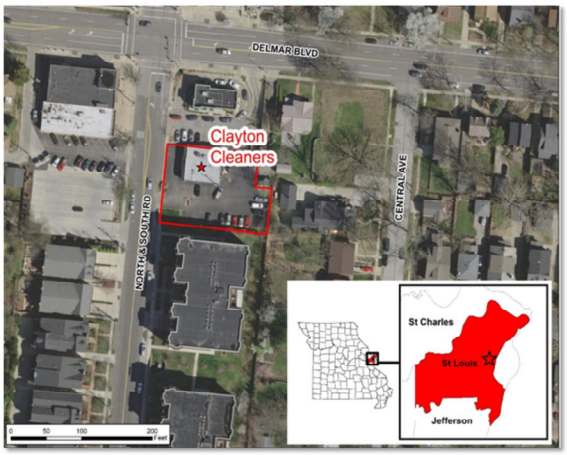

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Previous Investigations

1997 Phase I & II Environmental Site Assessment

- Found PCE and breakdown products in soil

2004 Phase II Subsurface Investigation

- Found PCE and breakdown products in soil and groundwater

2005 Phase II Site Characterization

- Found PCE and breakdown products in soil and groundwater at former service station
- Clayton Cleaners entered Voluntary Cleanup Program

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Previous Investigations

2005 Quarterly monitoring of groundwater began

- Monitored PCE and breakdown products in several wells until 2008

2006 Clayton Cleaners applied for DERT funding

2010 Soil Gas Monitoring Report

- Found PCE in soil gas

2012 Site Characterization Sampling

- Heavily impacted groundwater around Clayton Cleaners building

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Previous Investigations

2012 MDNR notified Clayton Cleaners of limited DERT Funding

2015 EPA guidance for assessing vapor intrusion pathway published

2017 DERT Fund expired

- Site referred to Superfund following expiration of the DERT fund

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At Clayton Cleaners facility:

- 6 monitoring wells
- 2 soil gas probes
- 2 subslab vapor ports

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Clayton Cleaners facility:

- PCE and breakdown products in all samples at Clayton Cleaners
- Results are above screening levels
- Findings consistent with previous site characterization

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At surrounding properties:

- 3 sewer manholes
- 4 soil gas
- 3 subslab vapor ports
- 1 sump pump

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Surrounding properties:

- PCE and breakdown products in sewer gas
- PCE and TCE in soil gas/subslab vapor

Some results exceed EPA screening levels

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540 North and South Road:

- PCE found in all subslab vapor samples
  - Highest PCE result of 370 $\mu g/m^3$
  - EPA screening level of 360 $\mu g/m^3$
- TCE in 1 subslab vapor sample
  - Highest TCE result of 7.7 $\mu g/m^3$
  - EPA screening level of 16 $\mu g/m^3$
- PCE in water from sump pump
  - PCE result 3.65 µg/L
  - EPA screening level of 15 µg/L

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Conclusions

- PCE and breakdown products migrated away from Clayton Cleaners facility
- Highest concentrations are at Clayton Cleaners facility
- Primary concern remains vapor intrusion
- Further investigation is warranted

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Next steps

- Legal order for additional site characterization, sampling, and potential cleanup
- Next steps:
  - Conduct indoor air sampling
  - Conduct additional subslab sampling
  - No cost to residents

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Future Communication

- Files open to public
- Webpage with fact sheet updates
  - https://dnr.mo.gov/pubs/pub2821.pdf
- Comment cards
- Communication survey forms

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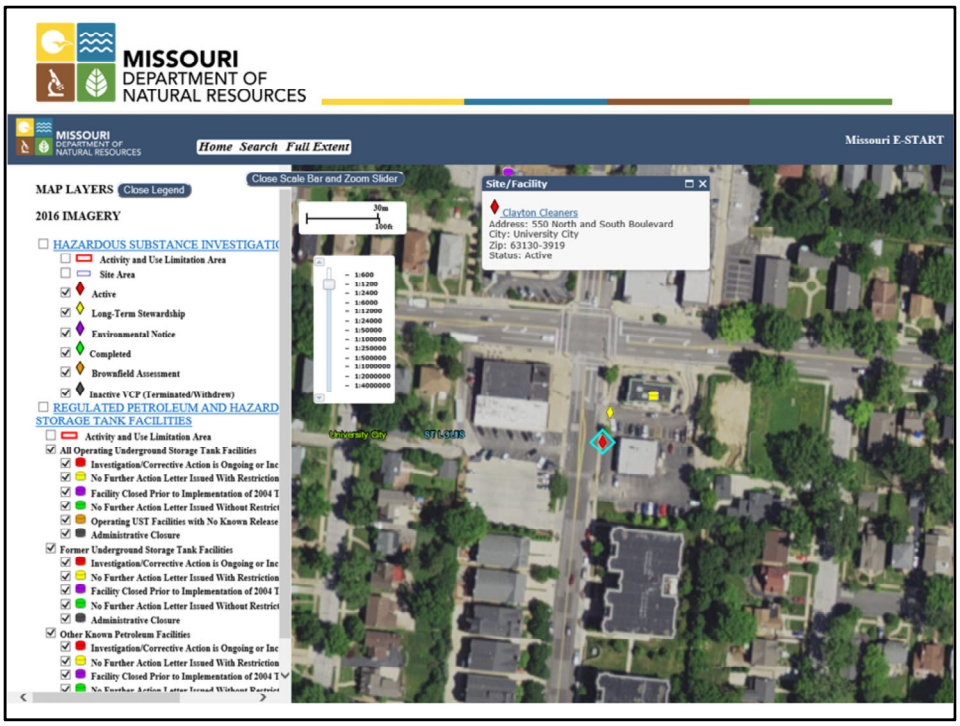
Environmental Site Tracking And Research Tool (E-START)

- Interactive map of environmental sites
  - Superfund sites, storage tank sites, regulated facilities, etc.
- Investigation and cleanup information

https://dnr.mo.gov/ESTART/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Home Search Full Extent
Missouri E-START
Close Scale Bar and Zoom Slider
MAP LAYERS Close Legend
2016 IMAGERY
HAZARDOUS SUBSTANCE INVESTIGATI
Activity and Use Limitation Area
Site Area
Active
Long-Term Stewardship
Environmental Notice
Completed
Brownfield Assessment
Inactive VCP (Terminated/Withdrew)
REGULATED PETROLEUM AND HAZARD
STORAGE TANK FACILITIES
Activity and Use Limitation Area
All Operating Underground Storage Tank Facilities
Investigation/Corrective Action is Ongoing or Inc
No Further Action Letter Issued With Restriction
Facility Closed Prior to Implementation of 2004 T
No Further Action Letter Issued Without Restrict
Operating UST Facilities with No Known Release
Administrative Closure
Former Underground Storage Tank Facilities
Investigation/Corrective Action is Ongoing or Inc
No Further Action Letter Issued With Restriction
Facility Closed Prior to Implementation of 2004 T
No Further Action Letter Issued Without Restrict
Administrative Closure
Other Known Petroleum Facilities
Investigation/Corrective Action is Ongoing or Inc
No Further Action Letter Issued With Restriction
Facility Closed Prior to Implementation of 2004 T
30m
100ft
1:600
1:1200
1:2400
1:6000
1:12000
1:24000
1:50000
1:100000
1:250000
1:500000
1:1000000
1:2000000
1:4000000
University City
Site/Facility
Clayton Cleaners
Address: 550 North and South Boulevard
City: University City
Zip: 63130-3919
Status: Active

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Thank you

Contact:

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