

## TCE Vapor Intrusion Rapid Response



### The Challenge & Charting a Path Forward

Buildings nationwide have been evacuated because of trichloroethylene (TCE) vapor intrusion (VI) disrupting operations and costing a lot of money. This emerging issue has regulators' attention focused on potential short-term health risks to pregnant women from inhalation of TCE vapors in indoor air. Concerns about VI are leading to unplanned financial, operational, and reputation impacts for businesses and government agencies across the United States and other countries. Any time TCE contamination is identified in shallow soil or groundwater, there may be concerns about the potential for VI.

Jacobs is on the forefront of responding to VI issues. We provide our clients with critical planning, assessment, and technological support to avoid business disruption and unfavorable publicity.

#### The Origin of the Problem

Regulatory agencies, concerned about short-term exposure, have started requesting "rapid action" to control VI at sites impacted by TCE. Heightened interest began in 2011 when the U.S. Environmental Protection Agency (EPA) updated the non-cancer inhalation toxicity value for TCE (calculated based on the potential for fetal heart malformations). Technical problems with the underlying toxicological studies and their use by the EPA to establish the short-term exposure limits (called rapid response action levels, or RALs) are known. However, the EPA and several state regulatory agencies maintain the risks must be addressed, basing their opinions on both the disputed animal studies and several human epidemiology studies that suggest increased risks of birth defects in TCE-exposed populations. While the science remains uncertain, we do not expect quick change in regulatory policy. Even if the EPA policy changes, the uncertain science will likely continue to provide a basis for more precautionary state, local, and individual decisions.

#### Impacts

VI rapid response can be costly, running in the millions of dollars. Non-financial impacts include increased regulatory scrutiny, concerned occupants, and public outcry. Temporary relocation of building occupants can have significant operational impacts. A number of relocations have occurred at sites across the U.S. In 2013, it was widely reported that 1,000 staff at Google's Mountain View, California, campus were relocated when it was found that VI from a nearby Superfund site (not related to Google's operations) was occurring. Relocations due to TCE in indoor air have also occurred at multiple U.S. military facilities.

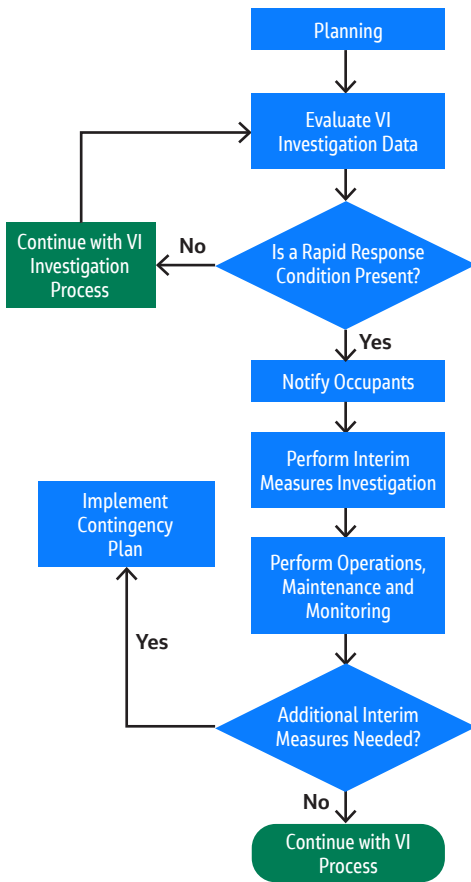
#### Planning

Rapid response planning should be completed before indoor air samples are collected. Planning includes:

- Identification of potential interim measure technologies (see Mitigation Methods below)
- Procurement planning for contingency equipment and services, including identification of vendors and services potentially needed; lead times for those purchases; and preparation of draft statements of work and purchase orders
- Identification of sampling and monitoring data needs to target interim measures and evaluate effectiveness
- Identification of stakeholders and an engagement plan (access agreements, fact sheets, presentation material)
- Evaluation of the feasibility of occupant relocation, should this be necessary

Careful planning allows our clients to respond promptly to elevated concentrations detected in indoor air.

## TCE Rapid Response Process



## Mitigation Methods

A number of mitigation technologies can be implemented if an investigation reveals the presence of TCE above the RALs in indoor air. Generally, for any building, one or a combination of the following measures is implemented:

- Sealing vapor-entry points and surfaces
- Whole-air filtration, typically using portable granular activated carbon air purifiers
- Modifying existing HVAC systems
- Temporarily switching to high-volume ventilation and possibly controlling the building's air-pressure
- Temporarily or permanently relocating building occupants or operations—a practical option in some cases

The results of the VI investigation and the building's characteristics (construction, condition, and use) dictate which mitigation measure or measures are most appropriate to reduce the indoor air concentrations of TCE relative to the RAL.

## Mitigation Methods Effectiveness Matrix

Mitigation Method	Tested for VI?	Potential Impact on TCE VI	
		Small Building Low VOC Source Strength	High VOC Source Strength Large Building Preferential Pathways
Sealing entry points	Yes	Positive	Limited
Air filtration	Yes	Positive	Limited
Adjust existing HVAC	Yes	Positive	Limited
Temporary high-volume ventilation/pressure control	Used for mold/moisture general IAQ	Largest	Largest

## Sampling and Monitoring

To determine where to implement a mitigation and then to evaluate a mitigation's effectiveness, sampling and monitoring are required. Jacobs uses real-time monitoring extensively during rapid response situations.

## Moving Forward

Rapid response can be one of the most challenging aspects of managing a site with TCE impacts to indoor air. Numerous technical, regulatory, and logistical challenges must be overcome, and site conditions must be carefully considered when deciding to implement a rapid response. These conditions affect the level of effort to prepare for rapid response and the way in which the risks should be communicated to affected stakeholders.

Jacobs has 175 locations around the world to serve your VI rapid response needs. Our experts are ready to help.

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## About Jacobs

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