



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 7**

11201 Renner Boulevard  
Lenexa, Kansas 66219

**FEB 24 2016**

Mr. David Keim  
Occupational Safety and Health Administration  
1222 Spruce Street, Room 9.104  
St. Louis, Missouri 63103

Dear Mr. Keim:

I spoke to a member of your staff, John Schauster, on February 9, 2015 and February 10, 2015 regarding trichloroethylene (TCE) air exposures inside Meramec Caverns located in Stanton, Missouri. This cave is utilized as a "show cave" by a private owner. The U.S. Environmental Protection Agency (EPA) has been investigating TCE groundwater contamination in the Sullivan\Oak Grove Village area for several years. Investigations have concluded that contamination in the area is discharging into a spring that surfaces inside Meramec Caverns. TCE air concentrations in recent years have been as high as 660  $\mu\text{g}/\text{m}^3$  in portions of the cave where tour guides work.

On December 12, 2014, the Missouri Department of Health and Senior Services (MDHSS) issued a letter health consultation regarding the TCE air contamination inside the cave. The enclosed Health Consultation provided recommendations for actions to be taken at Meramec Caverns. These actions included the following:

1. Inform workers of elevated TCE concentrations in cave air and the potential health risks associated with TCE inhalation. DHSS recommends notification be made as soon as possible.
2. Implement permanent measures to mitigate vapor intrusion into the cave as soon as possible. Consider implementing temporary measures to prevent TCE exposure to female workers of childbearing age until permanent mitigation solutions are in place. Once a permanent solution is in place, conduct periodic monitoring to confirm that mitigation solutions are effective in reducing contaminant levels.

The owners of Meramec Caverns confirmed to the EPA in January of 2015 that the workers had been notified of TCE health risks and that steps had been taken, and were to be taken in the future, to minimize workers' exposures to TCE contaminated air within the cave and the gift shop.

In addition, efforts have been made to study the cave ecosystem in order to increase the understanding of air flow and the actions that need to be taken to reduce TCE in the air within the cave and gift shop.



Some actions have been implemented, such as the installation of airlock doors and the opening of passageways, with the intent to mitigate the TCE within the show cave and gift shop. Air sampling activities were performed within the cave and gift shop throughout 2015. The sampling results have revealed that the efforts to date have not yet been successful in adequately mitigating the TCE air levels to the extent necessary to be protective of the health of workers.

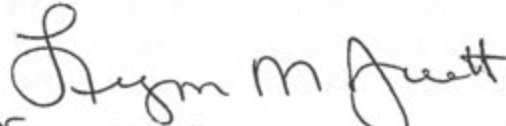
On February 1, 2016, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a follow-up letter to the 2014 Health Consultation. A copy of the letter is enclosed. The ATSDR letter states as follows with respect to Meramec Caverns:

ATSDR recommends that exposures be stopped until such time as air TCE concentrations in the cave complex are consistently below a level of concern.

A large cave complex, such as the LaJolla Cave Complex, is a complicated environmental ecosystem. That complexity makes it extremely difficult to determine what can be done to reduce the TCE in the air within the cave. Additionally, the complexity also means that actions taken to reduce TCE within the cave may have unintended consequences on the cave ecosystem. The EPA is requiring additional studies and mitigation activities within the cave in an effort to get concentrations below levels of health concern. In the meantime, the EPA has met with the cave owner regarding potential changes in business operating procedures that could reduce exposures as much as possible.

From my discussions with Mr. Schauster, the TCE detections in the cave would appear to be below levels of concern for the Occupational Safety and Health Administration (OSHA). I am enclosing copies of the 2014 Health Consultation and the ATSDR letter and a table summarizing the TCE air data that has been collected to date within the caverns. Please review the enclosed information and if you have any concerns or questions regarding the data and efforts being taken to address exposures, or if you anticipate that OSHA will do your own investigation, I would be happy to discuss the matter further with you and your staff. I can be reached by telephone at 913-551-7589 or via email at [howell.tonya@epa.gov](mailto:howell.tonya@epa.gov).

Sincerely,

  
for Tanya Howell

Remedial Project Manager  
Missouri/Kansas Remedial Branch  
Superfund Division

Enclosures (2)