

World Trade Center: Continued Detection of Dangerous Gases

New York City

Data validity:

The validity of the information portrayed in this product is based on remotely sensed hyperspectral data. Analytical processes followed traditional spectroscopy procedures. The gases delineated were verified with spectral signatures from commercial spectral libraries.

ANALYSIS:

Analysis of 24 October hyperspectral data of the World Trade Center (WTC) area revealed variable patterns of multiple volatile gases. Ammonia and chlorodifluoromethane (freon-22) were present near the shells of the North and South WTC towers and other locations at the WTC site. (Included graphic indicates the detected gases and their suspected source locations where possible.) While conditions at the WTC site are constantly changing, the following can reliably describe gas detections during the collection period:

Sources of gas emission:

Ammonia and freon-22 were identified in and around the North and South WTC towers - throughout the 24 October observation period. Most gas emissions appear to be associated with sources from within the debris piles at the WTC site.

Freon-22 is likely originating from the refrigeration infrastructure at the WTC. The emissions may be the result of one or more leaks in the 12 pressure tanks in the basement between the two towers. Other sources include the lines leading away from these tanks or from the associated pressure relief valves.

?? Freon-22 is a heavier-than-air gas that may tend to form in still pockets that are protected from wind currents.

?? Freon-22 is not a hazardous gas, but in high concentrations can become a risk.

Ammonia has been observed above the ruins in low concentrations. The presence of ammonia may be a result of the reduction of amines or other nitrogenous material at the site. It reacts with acidic materials that may be present in the air - including water, acetic acid, and hydrochloric acid.

A common source of both ammonia and freon-22 appears to be the west edge of the crater within the remains of WTC 6. Emissions were episodic.

Freon-22 (chlorodifluoromethane):

Freon-22 was detected and identified at the WTC site. Observed concentration path lengths of 1-10 parts per million-meter* are consistent with small leak rates of < 10 grams per second.

?? The observed emissions were variable in size, intensity, and location.

?? Many of the observations are consistent with the known locations of the 12 large freon tanks at the WTC site.

Ammonia:

Ammonia was detected and identified emanating from the debris piles of both the North and South Towers at approximate concentration levels of 100 parts per million meter. The source of ammonia is unknown but may be a result of the high temperature decomposition of a number of materials in a reducing environment.

Methanol:

Methanol was detected and identified, principally from the South Tower. Concentration lengths were measured at approximately 10-100 parts per million meter*.

Toxic carbonyl products:

The presence of toxic carbonyl products (e.g., phosgene) has never been detected at even moderate confidence in these analyses.

Additional analysis:

Analysis of additional data sets is continuing.

* The concentration path length products (parts per million meter) is the product of the average concentration in a plume above a point on the ground and the depth of the plume. The sensor used in these analyses does not provide a good measure of either of these quantities independently.