



Understanding the Results of Sampling From the EQ Fire in Romulus, Michigan

On September 8, 2005, the U.S. Environmental Protection Agency (EPA) released data reports from sampling conducted during the agency's response to the August 9 fire at the EQ Resource Recovery plant in Romulus. The reports included the type of sampling done, what chemicals were found and at what concentrations, and related quality assurance/quality control (QA/QC) information. Since these reports were strictly a summary of the environmental sampling data, they did not include screening levels used by health agencies to determine if the chemicals posed a public health hazard, nor did they include the health agencies' conclusions.

This factsheet describes the steps that the federal Agency for Toxic Substances and Disease Registry (ATSDR) and the Michigan Department of Community Health (MDCH) took to assess the public health impact of the fire at EQ. MDCH will write up the health agencies' response to the fire in a detailed report called a Public Health Consultation. This factsheet provides basic information regarding the sampling results and their interpretation.

What chemicals were looked for? Why and how?

The chemicals of primary concern, which prompted the evacuation of nearby residential areas, were a class of compounds called volatile organic compounds (VOCs). These compounds easily become a gas, especially when heated, and enter the air. VOCs were in the liquid waste materials accepted and stored by EQ. Although VOCs are common chemicals (found in many cleaning and hobby products), high concentrations in the air can cause harm.

EPA tested for VOCs in the air using several types of instruments. Initially the EPA, in conjunction with Several Local Fire Department Hazmat Teams, sent out 5 teams to monitor the neighborhood downwind of the facility. These teams were sent out shortly after arriving at the site and started 3 miles away taking air measurements as they moved closer to the facility. Based on these air measurements, the agency and the Fire Departments set 12 AreaRAEs ("area rays," multiple-gas detectors) at cross streets about 1/2 mile away the facility to monitor total VOCs. Due to changes in weather conditions, the AreaRAE's were reduced to 3 and moved closer to the facility. Although these monitors do not identify specific compounds, monitoring for total VOCs allows safety personnel to determine whether overall air concentrations of VOCs could pose an immediate risk to response workers or the public. The results of the AreaRAE monitoring are posted at the EPA website, <http://www.epaosc.net/EQResourceRecovery>.

The next way EPA tested for VOCs was by use of the ASPECT aircraft, which can fly over an air release and detect chemicals using infrared technology. The plane, which had been stationed in Texas, arrived in Michigan around 5 AM Wednesday morning and began collecting data

around 6 AM. The results of the ASPECT screening are posted at the EPA website, <http://www.epaosc.net/EQResourceRecovery>.

The third method EPA used when testing for VOCs consisted of collecting air samples in SUMMA (“SŪ-mah”) canisters. These canisters are sealed under vacuum. Air samples enter the canisters at a specified flow rate. The analysis can identify about 60 different chemicals at very low concentrations. The results of the SUMMA canister data is available at the EPA Public Repositories, which were established at the Wayne and Romulus public libraries.

Another class of chemicals of public health concern that potentially could have been released during the EQ fire was polyaromatic hydrocarbons (PAHs). These chemicals commonly are formed during incomplete combustion. They can be found in soot, engine exhaust, and grilled food, among other sources. EPA and the health agencies wanted to know to what degree soot from the fire was depositing on neighborhoods. They also wanted to know whether there were chemicals present that would not be expected from what one would consider a normal fire. EPA took wipe samples from windows facing toward the EQ facility and from windows facing away from the facility. This method of sampling would identify the compounds and how much on them were on the wipe. This technology generally is used for industrial hygiene purposes, when employees are working in dusty settings. EPA also sampled soot and debris found on the ground and analyzed it for PAH content. The results for both kinds of PAH testing are listed in the EPA data reports as “BNA” (base-neutral-acid) analyses.

The wipe and soot/debris samples also were analyzed for metal content. Local residents reported metallic debris raining down several minutes after the initial explosion. ATSDR and MDCH were concerned that the granules could contain high concentrations of potentially toxic metals. The size of most of the granules would make them easily swallowed by children. Similar to the PAH sampling, the wipe samples would identify the metals present. Direct sampling of the soot and debris on the ground would identify whether there were concentrations of concern. The results for both kinds of metals testing are listed in the EPA data reports.

Lastly, the soot and debris were analyzed for polychlorinated biphenyls (PCBs). EQ is licensed to handle wastes containing PCBs, and at the time of the fire, it was unclear what the involved tanks contained. No PCBs were detected above the reported detection limit. The results are listed in the EPA data reports.

What health-based standards were used when evaluating the concentrations found? What were the public health conclusions of those evaluations?

Public health and environmental agencies use scientific information to evaluate potential health effects from chemical exposure that may occur over hours or days to a lifetime. In the case of the EQ fire, health agencies were most concerned with short-term exposure to potentially large amounts of airborne chemicals. The guidelines that ATSDR and MDCH used when evaluating the air concentrations at EQ include the ATSDR Minimum Risk Levels, the California Acute Reference Exposure Levels, the EPA Acute Exposure Guideline Levels, and the U.S. Department of Energy Emergency Response Planning Guidelines/Temporary Emergency Exposure Limits. Other screening levels used include the EPA values for comparison to long-term exposure, called Reference Concentrations (RfCs), for chemicals in air, and Reference

Doses (RfDs), for chemicals in soil or water. ATSDR and MDCH compared the air data taken at and around EQ with the various short- and long-term screening levels mentioned above and concluded that the concentrations seen should not be harmful.

Another concern that the health agencies had was regarding the fallout or debris that came down several minutes after the first explosion. As mentioned earlier, people reported that the debris or granules looked metallic. ATSDR and MDCH were concerned that, if the debris contained a high concentration of metals, younger children might eat some dirt containing the debris and potentially expose themselves to harmful levels of heavy metals. The health agencies compared the concentrations found in the debris to the Michigan Department of Environmental Quality (MDEQ) Direct Contact Criteria for residential soils. These criteria address skin contact with and eating of contaminated soil. The agencies found that the concentrations of metals in the debris were less than the Direct Contact Criteria and were close to background (expected) soil concentrations. Therefore, contact with the debris should not cause harm.

MDCH will discuss the health agencies' evaluations and conclusions in further detail in the Public Health Consultation for this site.

People have reported various health effects - difficulty breathing, burning skin. That would indicate that the chemicals affected them, wouldn't it?

Yes. It is likely that the initial explosion at EQ released a large amount of chemicals in a short time. Inhaling smoke or chemical vapors when they are released in such a burst can cause immediate and acute effects, such as those described. However, the fire started to consume the chemical vapors (VOCs) immediately and the intensity of the blaze decreased the formation of PAHs (soot). Because exposure was short and has since stopped, the effects people experienced are not expected to be lasting.

The sampling in the data reports and the other monitoring shown on the EPA website (<http://www.epaosc.net/EQResourceRecovery>) was done some hours after the initial explosion. What was in the air immediately after that first explosion?

We do not yet know what specific chemicals may have entered the air following the first explosion. EPA and EQ are investigating which tank started the event. Records at EQ will show what chemicals were in the tank. It is unlikely that we will ever know the actual concentration of the chemicals released into the air at the initial stages of the fire. That is because wind speed and direction can vary within a short distance, and the pressure in the tank, the force of the explosion, and the heat of the fire itself might have changed the waste into different chemicals.

Why didn't EPA sample for other chemicals?

The first step necessary was looking for the chemicals that are expected from a fire involving solvents (VOCs and PAHs). Although EQ is licensed to handle PCB waste, due to strict environmental rules, the company rarely (if ever) accepted this type of material. Nonetheless, ATSDR and MDCH requested that EPA analyze for those compounds. After careful consideration and discussion, the public health agencies concluded that the chemical levels seen should not cause harm. If the various testing results had indicated that there were concentrations of public-health concern, then further testing, for more chemicals, would have been needed.

There was discussion of testing for dioxins. Dioxins are a family of compounds that can be formed during incineration processes that involve products containing chlorine. Dioxins can be found in extremely small amounts all over the world. ATSDR and MDCH looked at what chemicals potentially were involved during the fire and considered the results of the PCB analyses to base their decision on whether dioxin testing was necessary. (Some PCBs are dioxin-like compounds. If PCBs had been present, that would have increased the likelihood that dioxins could have been present, however no PCBs were detected.) The health agencies concluded that the incident at EQ would not result in elevated dioxin concentrations in air or in soil.

What is the purpose of QA/QC (quality assurance/quality control)?

QA/QC is necessary to ensure that laboratory results are reliable and defensible. A QA/QC report can help determine whether the contaminants found and the concentrations detected were truly in the item tested (air, water, or soil) or if they might have been introduced during processing of that sample. QA/QC practices include testing blanks, duplicates, and spiked samples.

Blank samples are sample containers that do not hold an environmental sample. The container may be brought to the sampling site and either not opened (a “lot” or “trip” blank) or opened (“field” blank). The container may be left at the lab during the sampling event and then analyzed with the environmental samples, either going through the same preparation steps (“method” blank) or going directly into the machine (“control” or “calibration” blank).

Sampling staff will take duplicate samples in the field, sampling from the same location and using the same identifier for the container, adding a “D” to the number. This process allows a comparison between two “identical” samples. If there is a large difference between the samples, it could mean that there was an error on the sampler’s part or that there actually was more contaminant in one of the samples.

Laboratory staff will test spiked samples, sending a known concentration through the analytical machine to determine how accurately it is reading. There will be a pre-determined margin to determine if the difference between the expected reading and the actual reading is acceptable or if the machine needs adjustment. Duplicates of the spiked sample are read at the same time, to help further calibrate the machine.

Who should we call with our questions?

If a person is experiencing health problems, they should consult with their physician. MDCH can discuss health effects that can be expected after being exposed to a specific chemical. The contact number for MDCH is 1-800-648-6942.

For questions regarding the sampling methods and federal regulatory requirements for this site, contact the EPA at 734-692-7600. For questions regarding state regulatory requirements for this site, contact the Michigan Department of Environmental Quality (MDEQ) Waste and Hazardous Materials Division, 586-753-3842.