

Gila and Baker River Hot Shots participate in study of smoke exposure conducted by the Missoula Technical and Development Center in the firefighting work environment at the Baldy Fire



Baldy Fire, lone, Wash., -- Thomas Kelley, a squad boss for the Payson Hot Shot Crew from the Tonto National Forest, and Efen Balderas, lead firefighter for Westfall Engine 14 from the Sierra National Forest, were assigned by the Missoula Technical and Development Center (MTDC) to monitor the air that is being breathed by firefighters at the 500-acre Baldy Fire burning near Lone, Wash.

The information collected by Kelley and Balderas will be added to that collected during a ten-year Smoke Exposure Study that is being conducted by Dr. Joseph Domitrovich, project leader, MTDC Engineering, Technical Application and Support.

The testing equipment used for the study includes a tiny GPS unit, a Kestrel air temperature and humidity monitor, and a carbon monoxide monitor attached to a vacuum canister and battery. All three of these monitoring devices fit easily on a firefighter pack and weigh less than a pound. The monitors are attached to the pack strap and the canister/battery fits in a pocket on the outside of the pack.

The study is currently evaluating the air firefighters breathe in relation to their activity patterns during the work shift. The amount of carbon monoxide (CO) and particulate matter are measured through two devices worn by each firefighter. Particulate matter includes dust, silica, ash/soot, and any other substance in the air that can be inhaled by the firefighters. It is collected in the canister. Blood oxygen and carbon monoxide levels are also measured several times each day using a pulse oximeter, a commonly-used device that is placed on a patient's finger by a doctor.

Kelley and Balderas arrived at the Fire on Tuesday, August 4. They spent 3 days with 6 firefighters who volunteered to participate in the study from the Baker River Hot Shots (2 different firefighters each day) and 1 day with 2 volunteers from the Gila Hot Shots. These days were spent attaching testing instruments to packs, documenting and time-stamping everything the firefighters did, using special computer applications to record how long they hiked, drove, mopped up, or constructed fire lines. The Gila Hot Shots had previously participated in the study and were interested in helping out again as much as possible.



MTDC Smoke Exposure Study Photographs



Thomas Kelley (left) and Efen Balderas stand beside their research trailer at the Baldy Fire Incident Command Post.



Efen Balderas models a firefighter pack with monitors attached to the strap.



Kestrel weather (humidity and temperature) monitor and GPS locator (red pouch).

The small air pump carried by the firefighters has a filter called a grit “pot” that collects particulate matter from the air. At the end of the day, Kelley and Balderas measure the amount of dirt, dust or ash in the pot and enter the volume into one of their data bases. This figure, along with the weather and carbon monoxide measurements, is downloaded for each volunteer who is identified only by gender and a number. They also measure relative humidity, wind speed and temperature for the four-day period using a Remote Automated Weather Station and record the findings.

Kelley and Balderas were recently assigned to the Reynold’s Creek Fire, burning in Glacier National Park. All of the data they collect will be combined with the data from other fires collected over a ten year period by Domitrovich. The men were recently assigned to the Reynold’s Creek Fire, burning in Glacier National Park. This season, they have monitored the exposure of 18 fire fighters to smoke at two wildfires. By the end of the season, they expect to have monitored nearly 60 firefighters during their 120-day detail as field technicians. Both are fire line qualified, but do not participate in the fire suppression activities. “We do help out where we can, but we are there to collect data, not work on the fire,” Kelley said.

This is Balderas and Kelley’s first detail as field technicians for the Smoke Exposure Study. They spent the first week of their detail learning how to set up and maintain the equipment they are using and how to use the special applications for recording the data. They are also involved with a second study being conducted by MTDC to measure heat stress and physical fitness of firefighters. Kelley and Balderas conducted testing for heat stress on four firefighters from May to late July before going to the Reynold’s Creek Fire.

The pair will study smoke exposure on at least three more fires by mid-September. They travel to each fire with a utility trailer, outfitted with work stations, ruggedized computers and communications equipment.

The data Kelley and Balderas collect will ultimately be used to develop mitigation recommendations for use by fire managers to protect firefighters who work in smoky and dusty environments.

For more information about the Smoke Exposure Study, contact the Missoula Technical and Development Center at 406-329-3900 or Dr. Joseph Domitrovich at jdomitrovich@fs.fed.us.



Vacuum canister and battery fits inside a backpack pocket.



Ruggedized computer located at a workstation inside the research trailer.



Firefighter uses a chain saw to cut through and disperse burning ground fuels at Baldy Fire, located approximately six miles northwest of lone, Wash.