

Rapid DNA identifies conception boat fire victims

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Credit: U.S. Department of Homeland Security

Thirty-four people died in a tragic boat fire on September 2, 2019, off the coast of Santa Cruz Island, California. Five crew members escaped with injuries after calling for help, but the intense fire aboard the Conception dive boat left the other victims unrecognizable. Thanks to a technology funded by the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) and developed by Massachusetts- and Colorado-based ANDE Corporation, the 33 passengers and one crew member who died were quickly identified.

"The Santa Barbara Sheriff-Coroner relied heavily on a Rapid DNA instrument to identify the victims in 10 days," said Chris Miles, the S&T Program Manager who led the S&T Rapid DNA project. "That is an amazingly fast resolution to the disaster that just wouldn't have been possible before."

The Rapid DNA instrument was on loan from another California jurisdiction—the Sacramento County Coroner and one of her deputies brought

their own instrument, used last year during the Camp Fire, to help with the Santa Barbara incident.

"It's so great to see expertise being passed on to other local agencies," Miles said.

The Rapid DNA instrument, the size of a desktop printer, was a result of the DHS S&T Small Business Innovative Research (SBIR) program, which challenges industry to bring innovative homeland security solutions to reality. DHS sought a technology that can quickly analyze DNA to verify [family relationships](#) (kinship) and identify victims of mass casualty events and human trafficking. The ANDE corporation received an investment of more than \$5 million from DHS S&T to develop the Rapid DNA instrument that identifies samples in as little as 90 minutes.

The traditional turn-around time for DNA analysis is months or even years. 'Why?' wondered Dr. Richard Selden before he founded the ANDE Corporation. Due to backlog, results can take from six to 24 months.

"I created the term 'Rapid DNA' as shorthand for a system that would allow nontechnical users to generate DNA identifications outside the lab in less than two hours," said Selden. He founded ANDE Corporation in 2004 specifically to develop Rapid DNA. "When I met Chris Miles more than 10 years ago, he believed in Rapid DNA, pursued it, found funding for it, and advocated for it. Chris believed Disaster Victim Identification would be a great application for Rapid DNA. All that played a major role in our success."

From the onset of its conception, Rapid DNA was designed to preserve the privacy of the tested. The instrument analyzes only the so-called 'junk DNA' – small chromosomal regions that do not code for genes. This DNA, scientifically known as 'short tandem repeats,' does not reveal individual

characteristics like hair and eye color, or medical conditions.

The Rapid DNA technology has already been tested in a number of mock disaster victim identification exercises. It has also been used in real disasters, such as the 2018 Camp Fire in California (the ANDE team identified 85% of the victims), providing closure to families and loved ones.

Rapid DNA identified the victims of the Boat Fire

Before going home after assisting with the Camp Fire, the ANDE team trained several employees from the Sacramento Coroner's Office and left behind one Rapid DNA instrument to help them identify unidentified remains from other cases. The same instrument was used for the recent boat [fire](#).

"Hopefully, God willing, there aren't many large-scale disasters, but if you are prepared, that means you can use this technology for disasters and for one-off cases," Selden said. "And that is exactly what happened with the boat fire—Sacramento County was prepared."

"After we did the identifications in the Camp Fire, most coroners in the state of California knew what we did," said Sacramento County Coroner Kimberly Gin. "So, when the Santa Barbara Conception Boat Fire happened, Santa Barbara asked us to come down."

On the same day the fire started, Gin and her deputy coroner drove their morgue van with the Rapid DNA instrument to Santa Barbara. They started running samples as soon as victims were retrieved from the water. Within two days, all victims were recovered except one. To identify a person, his or her DNA must be compared to a blood relative's. The last victim was finally found on September 11. Between September 2 and 11, all 34 victims were identified with Rapid DNA.

"We were able to bring closure to families the same day they gave samples," Gin said.

"It was really gratifying to see. Our goal was to

empower people in agencies around the country to be able to do this work themselves," said Selden. "I think it was one of the fastest, if not the fastest, identification of mass casualty victims in history."

Future applications of Rapid DNA

More and more jurisdictions are following the lead of these California agencies in using Rapid DNA for disaster victim identification. The disaster victim identification application of Rapid DNA is further being improved by adding a uniform data system for holding victims' and relatives' information so that relatives not present in the area can provide samples remotely.

S&T has been working with the American Society of Crime Laboratory Directors (ASCLD), which represents 600 State and local criminal laboratories, for using Rapid DNA on a daily basis to identify criminals and then use it during regional disasters. S&T and ASCLD are working to train labs to use Rapid DNA in their own jurisdictions.

"As there are 19,000 police departments across the U.S., the applications of Rapid DNA are huge," said Dr. Ray Wickenheiser, Director of the New York State Police Crime Laboratory System. "DNA data is more objective than an eyewitness. Further improving Rapid DNA is even better because it strengthens public safety or identifies the victims to bring closure in the event of a disaster."

Some states are already using Rapid DNA for criminal cases. Since 2018, Utah has been using Rapid DNA for many of their criminal cases such as identifying suspects and excluding non-suspects, and Kentucky is using it to help with sexual assault cases.

"Rapid DNA provided closure quickly to many grieving families for both the Camp Fire and the Boat Fire in California," said Miles. "We hope more and more jurisdictions will start using it for their disaster or criminal related cases."

Provided by U.S. Department of Homeland Security

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