

An educational document from the American Concrete Pipe Association for users and specifiers

On March 6, 2010 at approximately 6:30 PM residents of a Tucson, Arizona neighborhood were alarmed when black smoke began pouring out of the storm drain inlet and manhole in their residential neighborhood. Several people called in to report that fire was coming from a manhole in the residential neighborhood and the sheriff's department was dispatched to investigate. Several other residents called after seeing the thick smoke and stating that they thought a house was on fire somewhere in the neighborhood. Upon arrival by the sheriff's department the deputy noticed that there was smoke coming from a drainage wash area running north-south and from the housing development directly to the east of the wash. As the deputy got closer to the wash he noticed that flames were coming out of the 36-inch HDPE storm drain pipe that emptied into the bottom of the wash. A second deputy arrived in the neighborhood where heavy smoke was coming out a storm outlet and manhole that were connected upstream of the HDPE pipe that emptied into the wash.



The flames grew quickly and were observed to be shooting up past the 7-foot wall of the wash. Because the flames were now above the wash the first deputy began to divert traffic away from the fire. In the short time from the deputy's arrival and his initial assessment of the situation, he noted that the flames coming from the wash area had gotten bigger and more severe and were now reaching 15 to 25 feet in the air. The deputy acting quickly began evacuating people in the neighborhood due to the large amount of fire and smoke that he observed and not knowing if the buried gas lines in the area of the HDPE storm drain that was burning had been compromised. When HDPE burns the combustion products include hydrogen cyanide, formaldehyde, carbon monoxide and acrolein in levels that exceed the National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life or Health Concentrations (IDLH).



Upon arrival of the fire department the first fire engine crew entered the wash to attempt to extinguish the fire that was extending outside of the HDPE pipe with the flames shooting well above the 7-foot wall of the wash. A second fire engine crew was sent to investigate the smoke that was coming from a manhole and storm drain inlet in the housing development. While the fire engine crew worked to extinguish the fire from the wash the second fire engine crew began pumping water down the storm drain inlet and then the manhole in an effort to dissipate the smoke and extinguish the HDPE pipe that was burning. The fire department was successful in extinguishing the fire after attacking the HDPE pipe fire from both the wash at the pipe outlet and by pumping water down through the storm drain at both the storm drain inlet and manhole which are located upstream.

The fire area was identified as impacting approximately 50 feet of 36-inch diameter HDPE storm drain. Once the fire was extinguished the fire investigation indicated that the fire had started in the opening of the HDPE storm drain where it empties into the wash and quickly spread to the HDPE pipe itself which generated the high flames and large volumes of black smoke. The fire then traveled up the storm drain system and the smoke began to exit from the storm water inlet and manhole upstream. Due to the structural danger that the collapsed HDPE culvert now represented the fire department decided to make a visual inspection of the



culvert and not to make entry. The visual inspection looking inward into the burnt and melted HDPE pipe revealed that approximately 60% of the HDPE pipe had completely combusted or melted away. Black plastic could be seen hanging down from the top of the HDPE pipe that had not been consumed by the fire. A firefighter had also entered the end of the tunnel that opens into the manhole and also reported a structural collapse of the HDPE pipe. The street that the storm drain was under was barricaded off until the storm drain system could be inspected, evaluated structurally and repairs could be made to ensure safe use of the road. It is believed that the fire was started in the pipe by either a transient or vandals as they frequent the wash area. The HDPE storm drain was installed by a private developer when the residential neighborhood was developed although there are restrictions to using HDPE by the local municipality due to fire concerns.

Fire in the Hole

On May 7, 2011 at approximately 9:30 PM Central Yavapai Fire Department arrived at the scene of a fire inside of a plastic storm drain culvert pipe located at the intersection of Diamond and Emerald Dr. in Diamond Valley, a suburb outside of Prescott, Arizona.

As the fire crew began to extinguish the flames from both the inlet and the outlet (fire origination) locations of the pipe, they noticed the roadway above began to give way and called the police to close traffic in fear that a car driving by might break through the road surface. The 48" HDPE culvert pipe had slurry to the top of the trench since only 2' of cover was obtained in design. After 15 minutes, the fire was successfully extinguished. Engine 53 was called to the scene to conduct a survey of the confined space in the event that someone remaining in the pipe had been overcome by the fumes from the burning plastic. Engine 53 was not able to examine the entire pipe so the City of Prescott utility department used a remote camera to finish the inspection. Fortunately, there were no victims found in the pipe. There were no witnesses on scene, but the fire was determined to be intentionally set.

Since the residential area around the fire is sparsely populated, the fire chief decided that no evacuations were necessary, but it was considered due to the potential of toxic fumes which could include hydrogen cyanide, formaldehyde, carbon monoxide and acrolein.

After the fire was extinguished, Brian Jaspers, Yavapai County Public Works Director arrived at the scene to determine the extent of the damage and how to repair it as quickly as possible since the roadway is the only access for many residents in the area.

The total pipe length of the crossing was 250' of which 20' of burned 48" HDPE was replaced with CMP using slurry to the top of the trench along with a concrete collar to connect the CMP to the existing HDPE. CMP was used as a replacement due to the fact it was readily available in the county supply yard. Traffic was restricted to 1 lane during the replacement and the repair area had to be repaved as well.

The replacement was completed in two days at a cost of \$8,000.00 not including the hardship to local residents. Since the fire, Yavapai County no longer uses HDPE and will be using RCP and CMP exclusively.

