

# **Boiler Explosion in Ohio, USA**

## **First Hand Observations from Andrew Semple**

*Last summer there was a fatal explosion of a Case-ploughing engine at the Medina County Showground in Ohio, USA where five people died and many more were injured. National Traction Engine Trust Chairman Andrew Semple visited the area a few weeks after the explosion when he was shown the wreckage of the engine and a harrowing video of the aftermath and preliminary police reports.*

*Andrew Semple writes, 'We continue to feel confident that the inspection regimes, together with the high standards of maintenance undertaken on boilers in the United Kingdom should prevent a disaster of this nature from impacting on our hobby. Nevertheless, it is important, not simply because of this incident, that we remain ever vigilant with our engines.'*

*With Andrew Semple's permission, his report, which was published last August, is reproduced here since it will be of interest to many NLSME members.*

Earlier in the year I had arranged to travel to Pittsburgh during August on family business. The fatal explosion at the Medina County Showground involving a Case-ploughing engine occurred a week or so before we actually travelled.

Since Pittsburgh is only around 200 miles from Medina in Ohio I made contact with Sheriff Neil Hassinger of Medina County with a view to learning, first hand if I could, about the tragic accident. After I had explained my background and given a thumbnail sketch of the working of the NTET Sheriff Hassinger freely offered me access to his team of investigators and permission to view the Case engine involved in the explosion and to report to the NTET on what I had seen and learnt.

The engine involved was a Case direct ploughing engine of some 20 tons weight, built to the normal American design. The engine had been driven to the showground for display at the County Show a distance of 1.2 miles, the journey taking about 25 minutes. A police car video shows the engine travelling down the highway up to 2 minutes before the explosion; careful examination of the video shows no outward signs of any problem.

The engine had stopped at the display area of the showground and the two police officers from the patrol car were approaching the crew to discuss their recent journey along the road with its newly asphalted surface when the explosion occurred.

On seeing the remains of the engine it is clear that the firebox crown collapsed. It folded downwards, tearing the tube plate away from the tubes

and pulling the sides and rear down to the fire hole door level where after it tore away completely.

The blast caused the ash pan to be blown to the ground followed by the fire grate and then the contents of the fire itself. These items hit the ash pan, shattered and then ricocheted outwards for over 100 feet causing much damage to surrounding vehicles and onlookers. The grate in particular created, what has been widely described in the press as, shrapnel. The police recovered some twelve buckets of shrapnel from the scene. The early reports of hot oil are misleading, as the engine was not oil fired and was only carrying a nominal amount of lubrication oil.

The effect of the blast lifted the engine ten to twelve feet off the ground and when it fell back to the ground it fell over towards its right side all of which resulted in damage to the whole structure wheels etc.

Examination of the firebox crown sheet reveals considerable wastage; the official report quotes areas with a thickness of 1 /16th of an inch and less. A local boilermaker informed me that he would have expected this plate to be at least 5/16th of an inch thick when new. The pitch of the stays was 4½ inches with 12 TPI on the stays. All of the stays were still located in the outer wrapper and there were no broken stays, although they showed some signs of wastage. Several of the stays had been welded to the crown on the fireside, these 'held on' longest when the failure occurred. There was no evidence of any nuts having been fitted on the stays in the firebox.

The fusible plug was in place correctly filled with tin, as required in the USA. The tin had not melted. The plug was located at the back of the box and in normal circumstances could be viewed above the fire hole door.

The water gauge survived the explosion; it and its passageways were clear on examination. The pressure gauge was known to be reading incorrectly by a quoted figure of 25 lbs/sq.in. It was tested after the explosion and found to be working correctly but with the same error displayed.

The safety valve on the engine was attached to the steam dome and was a modern self- contained type of valve, commonly available today. The safety valve was purchased, I understand in 1993 for the engine and was factory set and sealed at 160 lbs/sq.in. this being the working pressure of the engine. The National Physical Laboratory has carried out tests on this gauge. I was shown the report of the test that shows that the valve did not open at 160psi. with the agreement of the manufacturers, who were present at the tests, the test pressure was taken up to 250lb/sq.in and the safety valve still had not opened. The test was terminated at this point, as it was possible that the whole item could explode if pressure was increased further.

Pictures of the valve taken before testing had commenced show the valve still fitted with the manufacturers seals used to indicate if the valve has been tampered with in any way. The possibility of damage to the valve during the explosion cannot be ruled out and the valve is being x-rayed and examined before being dismantled for further examination. The investigators have an open mind on this point but there is no outward sign of damage to the safety valve. However, the whistle, which was also on the dome next to the safety valve, survived the blast intact and it is not nearly of such robust construction as the safety valve. Concern about this safety valve led the investigating officer to interview everyone who saw the engine on the day in question. Including a considerable number of enthusiasts who had also seen it at work direct ploughing 14 days before the event, no one can recall seeing the safety valve operate on any occasion.

There is a theory being widely discussed that the engine was low on water when it stopped moving at the showground. This may have allowed part of the tube plate to become excessively hot such that when the engine next moved water surged and covered the heated area, which suddenly created a large volume of steam thus precipitating the collapse of the crown. However this overheated area would be adjacent to the fusible plug and since the tin filling has a relatively low melt point it is difficult to imagine how this could occur without the filler melting. I understand that the showground area where the explosion occurred is relatively flat. The police took a video, which commenced within minutes of the explosion and this shows that the engine had water in the tanks at the time of the explosion and that the injector water valve was open.

The owner of the engine his son and their two helpers were all killed in the accident, a fifth person has also died. Approximately 40 other people were injured. The two police patrolmen who were approaching the engine were seriously injured but their bulletproof vests saved their lives in the force of the blast.

Referring to the Police video I do not ever again wish to see the results of such a terrible explosion and see the horrendous injuries inflicted on the dead and on the survivors! My sincere commiserations go to those who had to deal with the aftermath of the tragedy.

I should like to record my thanks to Sheriff Neil Hassinger and also to Lieutenant John Detchon the senior detective handling the investigation for giving me so much of their time and cooperation. Lt. Detchon had amassed a desk full of engineering books and has developed an impressive knowledge and understanding of locomotive boiler construction.

At present the Ohio statute book has a one-line entry that in effect precludes any boiler of riveted construction from the requirement of an inspection. The State Governor has promised that this rule will be reviewed.