Utilizing Coiled Tubing Technology to Control a Liquid Propane Storage Well Fire, A Case History

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ABSTRACT

Conventional well control techniques for normal oil and gas wells are widely known and have been presented before on numerous occasions. However, LPG storage (or cavern) wells rarely blow out and/or catch on fire. As a result, little information has been presented on the topic of well control for these types of wells.

This paper will chronicle a case history of a high volume liquid propane storage well fire. The capping and kill plan called for the use of coil tubing in a procedure that is believed to be the first use of this technology for this purpose. The paper will describe in detail the innovative use of a coiled tubing unit and technology in a well fire environment. The plan was successfully executed saving the operator millions of dollars in LPG product loss and cost of control.

INTRODUCTION

Oil and gas well fires are a rare occurrence. Liquefied Petroleum Gas (LPG) extraction well fires are an even more rare occurrence but they do happen. LPG is often stored in underground "caverns". These caverns are leached from salt domes or formations. The product is then pumped into the cavern and stored until such time that the inventory is needed for sale. The product is withdrawn from storage in an unconventional manner as compared to "normal" oil field practice. Oil and gas products are typically produced through the tubing placed in the well. In LPG storage wells, the tubing is used to pressure the cavern so that the product can be extracted. Water is pumped down the tubing and the LPG is withdrawn out of the casing/tubing annulus (see Figure 1).

EVENT

The events leading to a well fire are often not known in full detail. Well conditions however, are important to well control specialists regardless of the reason that the blowout occurs. The LPG facility discussed here is a propane storage terminal. This particular terminal has 2 storage wells with separate caverns in a salt dome for each well. The wells were originally drilled as oil producers in the late 1950s. One of the wells developed an undiscovered casing leak and propane began to escape through the surface soils to the atmosphere. Since propane has a specific gravity of 1.5, the leaking propane did not dissipate as lighter gasses would. The gas collected in the low areas around the terminal and surrounding forest. The gas found an ignition source and ignited. At the time of the event, there was 13 million gallons of propane stored in the well.

A water well used to supply water for cavern leaching located approximately 50 feet from the product withdrawal well was first to burn. The shallow water sand had become filled with LPG. The withdrawal well later ignited and burned. The entire wellhead and the surrounding cellar was engulfed by flames. Propane was also escaping through the soil to the surface in