# Contractors suffer burns whilst undertaking maintenance work on kiln

## WHAT HAPPENED

**Preparing for a burner shroud and lance change on kiln**

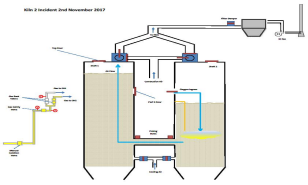
Contractors were asked to prepare for a burner shroud and lance change on Kiln 2, Shaft 2 (see diagram – additional pdf). They had been signed in and issued a confined space entry PTW in order to carry out the task prior to starting.

Following kiln shut down – the process closes 2 of 3 gas valves automatically and stops the combustion air blower. The filter ID fan is turned into manual mode and dampers set to seal shaft 2 and exhaust up shaft 1. The 3rd gas valve is closed via a separate action by the kiln control room operator.

From the control screen it was noticed that the 2 automatic valves had closed but the 3rd safety valve was in alarm mode. This was not acted upon and the work continued.

To confirm that the stone level had lowered sufficiently, a visual inspection was necessary through the part 5 door by the contractors. The initial inspection by the contractors confirmed that further lowering would be necessary and this was carried out by the kiln control room operator. When the contractors opened the part 5 door for the second time there was an ignition within the shaft causing burn injuries to the contractors.

It appears that the incident was caused by auto ignition of leaking gas: ignition taking place once the inspection door was open providing oxygen. It is possible the rear two shut-off valves had been leaking for some time, but a failure of the main valve allowed the incident to happen. In addition, failure to identify and act on the valve alarm from the control room is seen as a significant causal factor. The failure to routinely close the manual valve at table level indicates the reliance placed upon the hydraulic shut-off valves and this hadn't been considered that the valves could pass gas.



## LEARNING POINTS / ACTIONS TAKEN

- Instruction communicated to kiln control room operators that an additional manual gas isolation valve (at table level) must be in the off position AND the three usual gas isolation valves visually checked and confirmed closed before opening the part 5 door to inspect the Kiln.

- The top door must be opened, ID fan set to manual, reversal traps configured to draw down the inspection shaft and ventilation carried out for at least 5 minutes before opening the door.

- Kiln operating software updated to ALWAYS show the true gas safety valve position (open/close/in between) on kiln mimic even when in red alarm status.

- Ten replacement gas valves (5 per Kiln) and actuators have been fitted.

- Gas valve monthly PM schedule modified to include the checking of seal integrity i.e. weeping.

- Operational life of gas safety valves and gas rack valves limited to 1 year initially and PM schedule updated.

- Risk assessment and safe working procedure reviewed for this task.

- All other production and maintenance tasks that involve inspection or entry into the kiln identified and require a risk assessment and safe working procedure review.

- Signage at all gas valve isolation points to be reviewed to ensure clear cross reference with the gas isolation procedure.

- Retrain all operators in the process of reviewing and accepting software alarms.

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| **LOCATION:** | **LIME & SLAG PLANTS** | **ALERT STATUS:** | **Normal** |
| **ACTIVITY:** | **MAINTENANCE & HOUSEKEEPING** | **DATE ISSUED:** | **03/02/2018 01:05:32** |
| **SUB ACTIVITY:** | **N/A** | **INCIDENT No:** | **01481** |