



## Railway & Canal Historical Society - Pipelines & Materials Handling Group

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### Kensworth to Rugby Pipeline

By Graham H Wild

My wife and I were very fortunate on being invited by John Sharp of the Leighton Buzzard Society and of the RCHS Pipelines & Materials Group, to attend a talk on the Kensworth - Rugby Pipeline belonging to Cemex. This has been the subject of some Papers of this Group in the past. My wife was not very keen to go initially thinking it would be a bit boring but having been and heard the talk she was fascinated. The talk was given by Paul Russell, Pipelines & Projects Engineer for Cemex.



*This view of [TL0219 : Kensworth Chalk Quarry](#) focuses on the deepest level of the quarry where water has collected in eau-de-Nil pools. Some of the industry associated with the workings can be seen at a much higher level beyond the pit. Spot the parascender top right.*

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Cement is made from chalk 75%, flint 15%, clay 5% and iron scale 5%. The very precise mixture is initially heated in the preheater tower to 850°C which produces lime. It is then heated in a rotating kiln to 1,450°C for 40 minutes the result is clinker which is then ground with gypsum to produce cement.

Rugby Cement plant was opened in 1865 and is still in production. £200 million has recently been spent to improve capacity. The single kiln produces approximately 1.4 million tonnes of cement per year and is the largest in the UK.

The Rugby plant ran out of local raw material in 1935. The next source of supply was Totternhoe, near Dunstable, where the chalk was loaded into rail wagons for transport to Rugby at 900,000 tons per year. This source was running out in the early 1960s and the railway line between Luton and Leighton Buzzard was up for closure as a result of Dr Beeching.

The Kensworth Quarry was opened in 1963 with a projected life of 75 years of good quality material, but was nowhere near a railway. The location at the top of Dunstable Downs was also very unobtrusive. We had friends living in Studham just 3 miles away and had no idea that the quarry existed.

Rugby Cement now had a problem of how to get the raw material from the Kensworth Quarry to the processing plant at Rugby.

1. Rail transport - with the quarry on top of a hill and the original rail line closed would mean a continuous convoy of lorries to Leighton Buzzard along country lanes, this was considered to be unacceptable to the environment and local residents. With industrial unrest on the railways and transport arrangements in the hands of third parties this was considered an unacceptably high risk option.

2. Road transport - the same applies, a continuous convoy of lorries to Rugby, 57 miles distant, along country lanes initially then main roads, this was also considered to be unacceptable to the environment and local residents.



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3. Canal transport - weather dependant plus the growth of leisure use. Again the material would have had to be initially moved by road with the attendant problems mentioned above.
4. Overland belt conveyer - considered but no evidence could be found at the time (1962) that it had been used for moving material 57 miles. There were other concerns to be addressed, visual impact, vandalism, and the problems of road and rail crossings.
5. Pipeline - direct transfer from quarry to Rugby plant. No time restrictions on delivery. Rugby Cement would have complete control on the whole process. No environmental impact.

Whilst there had been pipelines in other parts of the world, those for the transfer of slurry were short in comparison with Rugby's proposal. So this was going to be a high risk 57 mile pipeline at £1 million per mile (at 2016 prices). Planning application was lodged and consent gained in 1963 to last until 2038. 36 million tons available at 125,000 tons per month. No blasting is permitted.

Water is taken from Houghton Regis Sewage treatment works at river quality, which has to be pumped uphill to the quarry for mixing with the chalk to make the slurry for pumping to Rugby.

The quarry is in operation 5½ days a week and has 10 benches (levels) which produces 5 different qualities of chalk which is blended to make the correct quality. Not able to go down too far in the quarry due to disturbance of the water table. The quarried chalk is mixed with the water to a moisture content of 33% forming a chalk slurry to be pumped 24 hrs per day 6 days a week.

The route of the pipeline from the quarry to Rugby goes via Toddington, follows the M1 from Junction 12 to Rugby. The pipeline is unique in the UK and possibly in the World. It was installed at the same time as the National Gas Distribution Main along the M1 which made the process much easier for obtaining the necessary legal easements and installation.



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Some facts - 57 miles long, goes under 250+ different land ownerships, 2 motorway crossings, 4 rail crossings, 2 river crossings, 2 canal crossings. 10" diameter from quarry to Brogborough (Junction 13 on M1), 11" from there to destination in Rugby. There are 3 pumps but only two are used at any one time. Slurry has to be pumped at an even pace in turbulent flow to avoid the chalk dropping out and causing blockage. Only one set of pumps in the quarry which move the slurry all the way to Rugby, no intermediate pumping. 1,800 lbs per sq inch pressure with a flow rate of 2.5 miles per hour i.e. takes 24 hours to travel from quarry to Rugby. Weight 1.75 tones per cubic metre. When the pumps start up after the weekend it takes 20 minutes before Rugby see the effect.

Maintenance - like all systems there has to be maintenance to keep the system running. Safety is very important do not want any environmental nor third party problems. Corrosion with the pitting inside of the steel pipe due to bacteria, metabolism of bacteria causes acid to form, fatigue cracks of the pipe.

Inspection - the pipeline is split into three sections, Kensworth to Brogborough, Brogborough to Patford Bridge, Patford Bridge to Rugby.

Inspection from erosion from bits in the slurry or manufacture defects is done by an intelligent PIG which is inserted into the pipeline and propelled by water supplied from the pond at Kensworth Quarry. There are various sizes of intelligent PIGs (Pipeline Inspection Gauge or Pipeline Intervention Gadget) to clean the pipe. Each PIG has a radio transmitter so that it can be tracked. These intelligent tools have to be booked months in advance because of worldwide demand. There are different PIGs to detect different scenarios. The cost of these inspections is £250,000 which has to be done every 2 years. It takes 3 months for the analysis of the data collected.

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