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PREESALL SALT MINES

by V. Landless.

Extract from the Times November 1906:- 'A descent into the Preesall Pit is an experience of unusual interest. Though the mining operations have only been conducted for a dozen years, the weird lofty cavernous vaults formed by the excavation of over 1,000,000 tons of salt are sufficiently impressive, when illuminated as they are by electricity, to bewilder the spectator who visits them for the first time. The rocksalt is so dense and tough that it is necessary to win it through blasting. It is discharged directly from the mouth of the mine into railway trucks beneath and is run down to Preesall jetty, where vessels and steamers of up to 1,600 tons, exempt from all dock dues, can be loaded with great rapidity. With such enormous supplies of salt at their command the United Alkali Company can not only supply all its own wants but has also become the second largest white salt manufacturer in Great Britain, having put down expensive evaporating works at Fleetwood and Middlesborough'.

HISTORY

The production of salt, from the evaporation of sea water had been carried out in the area for centuries, but the discovery of rock-salt came from a totally different direction.

In 1872 a total of 20 boreholes were sunk in the hope of finding a hematite deposit to match that of the Furness area. Of the 20 started, both near Fleetwood and on the other side of the River Wyre around the village of Preesall, only about 4 were actually completed, Nos: 2, 8, 9 and 17, and it was in number 2 that rocksalt was found in depth; although 8 and 9 also carried traces.

1875 saw the start of serious development when Rev. Daniels and Daniel Elleston, squire of nearby Parrox Hall became partners in sinking an exploration shaft near Lower Lockow Farm. The shaft was sunk round the number 2 borehole, and was 8 feet in diameter and finished with 4½ ins. of brick.

The next decade saw many more boreholes sunk to find the extent of the deposit and by 1885 the shaft had been deepened to a final depth of 610 feet, 340 feet being in varying grades of salt. The salt was removed in the form of a saturated solution referred to as brine. The salt deposit dipped to the North West at a rate of 1 in 3½ and so it made it possible to collect the liquid brine in a form of gutter built on the rock floor that was the lower limit of the deposit. This led to a receiving tank and via a pump of 9" bore and 5" stroke worked by a Bull engine to the main tank at surface.

The early partnership had sold out to the Fleetwood Salt Company before any salt had been raised. This company was formed to work the rocksalt deposit and when in 1888 the Salt Union Ltd., (formed to combine all the salt manufacturers of Britain), obtained the monopoly, it increased prices by 100% for common and 300% for fine salt;- the new company knowing it was onto a good thing refused to sell. Unfortunately in order to maintain capital, interest in the company was purchased by Joseph Wethered

and Mr. Charles Thomas of Bristol and Mr. F.A. Gossage of Widnes with their respective sons.

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Due to absence of any transport facilities capable of carrying the volume of production, an area on the West side of the river, at Burn Naze 2¼ miles South of Fleetwood (O.S. Sheet 102 N.G.R. 340440) was chosen as the siting of the purifying works. The Preston and Wyre Railway Company agreed to transport the salt to the docks at Fleetwood for a rate of 4d per ton plus 2d a ton for tipping loose salt into ships, for the following 2 years. A dam 500 yards long to reclaim 22 acres of marshland for the site of the saltworks was built by T. Riley of Fleetwood, and completed by October 1889. Sidings, 8 stove salt pans and drying stores were first built on the site, and a brine reservoir constructed by the shaft top connected via a 10" steel pipe across the river to Burn Naze. This was later replaced by an armoured rubber pipe to withstand the stresses imposed by the river and was to last 15 years.

Whilst preparations were in progress, the number 2 shaft had been allowed to flood in order to dissolve salt, but when the brine was pumped out it was found that the brickwork at the shaft bottom was virtually hanging in mid-air due to the salt being dissolved away from behind, and urgent repairs were needed. Whilst these were being attended to a drill rig from America was erected and commenced to bore number 21 borehole, and in December 1889 at 261' rocksalt appeared and immediately the borehole filled with water to the same depth as had been in number 2. Due to the borehole being sited on some of the few unacquired areas of land, no salt removal could take place from the hole at the time.

After repairs had been completed, salt extraction proceeded very well; fresh water being pumped from number 17 to number 2 shaft, left to saturate, and pumped to the works. In 1890 the company was bought out by United Alkali Co. Ltd., which would change the system of salt extraction for the rest of the mine’s working life, in fact it was to become a mine in the true sense of the word.

December 1890 saw the completion of number 23 borehole and salt at 174': there was no connection through to any other hole, so water had to be forced down an internal pipe, up again and then down number 21 for further enrichment. After 3 weeks, water ceased rising out of number 23 and could be pumped out of the number 2 shaft, a distance of just over 200 yards. In August 1891 it was found that the overlaying marl would not support itself over such a large area as had been hollowed out and an area of 1/3 acre sunk into a flooded hollow 40' deep. Further subsidence was to take place, although delayed, 10 years later around number 28 borehole, when on November 3 a hole 135' in diameter and 100' deep appeared, and is now 300' across.

The same problem was prevalent in Cheshire, with roads, houses, valuable land and the mines themselves subsiding into lakes called flashing; compensation had to be paid, and this was astronomical, so the decision was made to commence dry mining.

Tunnelling began from the bottom of the shaft in two directions, South-West and North, the levels being driven by hand. It soon became obvious this would take too long so Messrs. Stanley Brothers of Nuneaton contracted to drive a total of 250 Fm 5' x 5' tunnel with drill machines, taking 6 months to complete. This proved salt in both areas and gave the go ahead for the start of the second stage of dry mining.

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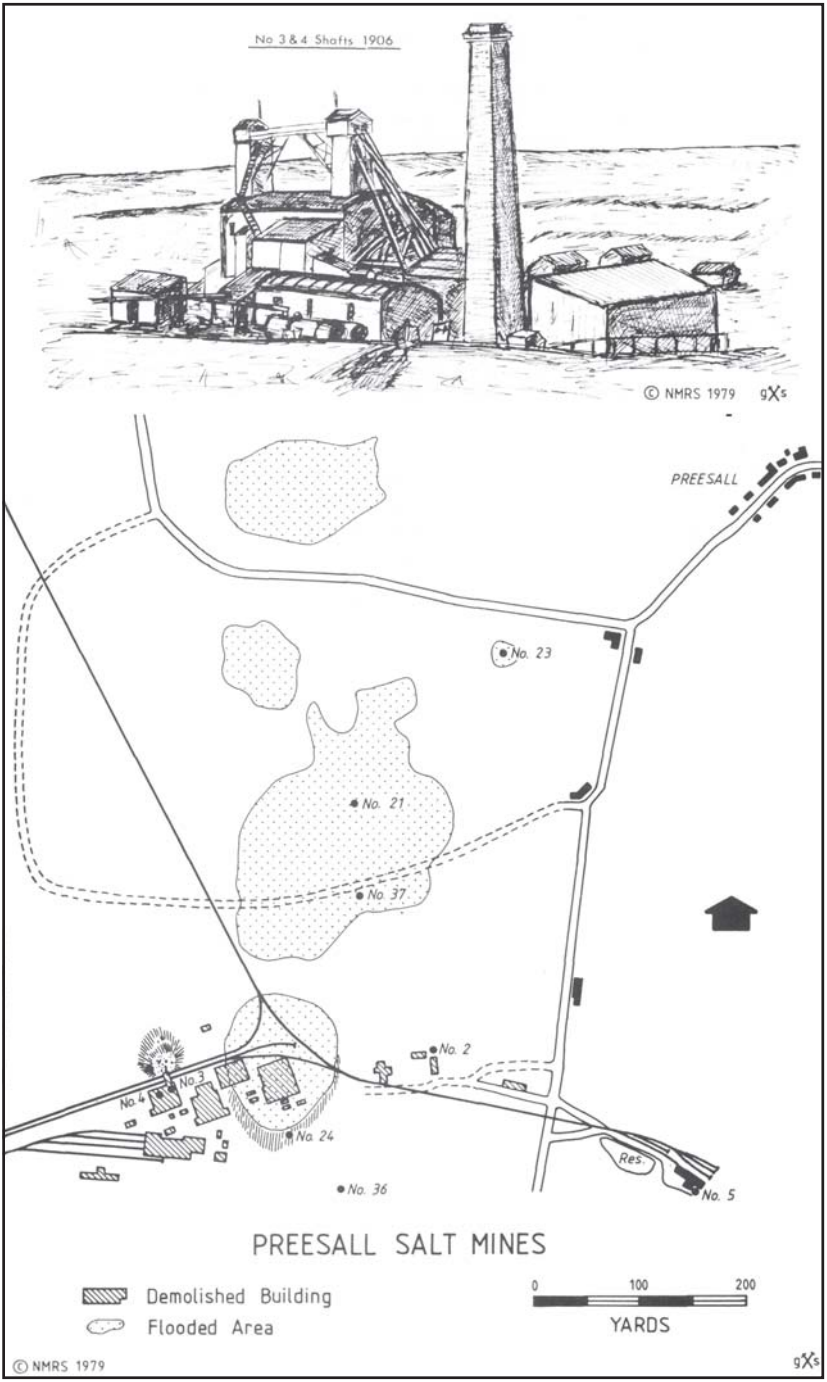
The sinking of two shafts, one 470' the other to 900' from the surface was carried out to enable two levels of extraction to take place simultaneously without removing an excessive height of material, and called the Upper and Lower mines.

Water in a metal mine is a nuisance which is tolerated, but in a salt mine water is a thing that must be avoided at all costs, so considerable work had to be done to render the shafts free from any inflowing water, which was not an easy task as the 7½' square shafts had to be sunk through boulder clay containing enormous boulders of limestone, and sandbeds holding pockets of water. To render the necessary waterproofing a blue brick and cement foundation was built on the overlaying marl when the boulder clay had been passed through, and cast iron tubing 6' in diameter extended to the surface, the free space being filled with clay.

Close proximity of the shafts (20 yards) enabled the same winding engine to be employed for both; a larger drum and rope used for the deeper mine, the difference in weight of the extended longer rope balanced by a weight attached to the shorter. As one rope ascended from one shaft the other descended the other, and although the longer could be used to rescue from the shallower shaft there was only one chance for those in the deeper mine. Cages as such were not used, but two guide ropes guided a horizontal bar from which 3 chains hung, and to these could be attached wooden tubs called hoppets. Transport to and from the face was by means of bogies on which these tubs were placed, each holding 30 cwt.

Salt mines had to be started like bell pits, enlarged outwards to form large caverns, therefore blasting was restricted to one area at a time. It was decided to employ a heading machine to drive two levels in opposite directions 4½' diameter, 120 yards per week, first one way then the other as the opposite one was enlarged to a full face height of 40' by further blasting. This enabled the mine to be worked eventually by undercutting a face 105' long 6' from the roof, and removing the floor by blasting in steps; blackpowder in compressed cartridges being used. Shot holes were drilled with an iron jumper bar with steel ends, and in rocksalt a 1½" diameter hole 5' deep could be drilled in 45 minutes. With the advent of more manageable types of power drilling machines, hand boring was discontinued, and Elliot rachet drills with friction feed brakes were modified to cope with the variation in hardness found when boring rocksalt, by fitting the feed screws with compressed air motors. This brought the drilling time for the same size hole down to 5 minutes. Pillars 60' square were left for roof support.


No 3 & 4 Shafts 1906
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PREESALL
No. 23
No. 21
No. 37
No. 2
No. 3
No. 4
No. 24
No. 36
Res.
No. 5
PREESALL SALT MINES
Demolished Building
Flooded Area
0
100
200
YARDS
© NMRS 1979

All the water for the various steam engines was obtained from boreholes in the Vicinity, and since this was very hard it required softening, a special plant being built for this purpose.

Production ran on average at 3,500 tons of rocksalt per week, grading out at 96.5% NaCl. Haulage underground was powered by compressed air, this being supplied at 60lb/square inch at 2500 cu.ft/min; the same being used to power the drills etc. An unusual feature was the illumination underground being all electric, mercury vapour lamps by Cooper-Hewitt being used as the primary sources. Natural air flow was sufficient, and no auxiliary means was required to assist the flow.

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As the size of the underground cavern became ever larger the brine wells that were still being used on a restricted basis were pumped dry and sealed to prevent any chance of flooding if they burst into the 'dry' workings. In order to maintain production it was decided to install bigger pumps down number 2 shaft, but it was found that the continual usage had further damaged the lining, and when this had been repaired and strengthened the new pumps would not go down. A decision was made to sink a new shaft, number 5, outside the known deposits and so avoid any further trouble with erosion; unknown at the time was that this shaft would be the ruination of the mine.

The number 5 shaft was finally sunk to a depth of 500 feet. Trouble was experienced in the first 100 feet as considerable amounts of quicksand were present. The shaft was 1020 feet in a South-Easterly direction away from the number 2 and tunnels were driven Westwards into the salt from the bottom, flooded with water, then pumped out.

Accidents were on average of similar frequency to those in metal mines, casualties from blackpowder explosions; flying lumps of rocksalt; pieces of timber and salt falling; and men being trapped by the bogies used to carry the salt, were the type of accidents one would find. A report dated 12th June 1905 read:- Two men, named Frederick Daves and Arthur Phillips, were dressing the shaft side in number 4 shaft (900') at a depth of 480' from the surface. They were working on a staging consisting of 2, 7" x 3" timbers let into the rocksalt with 3" planks spanning between. The area they were dressing was 14' 6" above the stage and 3 shots had just been fired bringing some large pieces of rocksalt onto the staging, weighing some 11 cwts, and falling 8 or 9'. Phillips said he was filling a hoppet standing on one side of the staging, the other man, aged 37, was doing same on other side. There being two hoppets on the staging, together weighing when full 3 tons. Phillips saw the staging go down on Daves's side, but no crack was heard. He grabbed hold of his vest at the shoulder to try to save him but losing his balance was compelled to release it. When he regained his balance he was in the hoppet. Daves fell 420' to his death, as far as Phillips could remember, without a cry.

With the progress in chemical technology NaCl. was being used as a raw material for many processes requiring either sodium or chlorine as a constituent. Alongside the

purifying works at Burn Naze sprung up a maze of chemical works owned by the United Alkali Co. to manufacture the various salt bi-products. Production continued well to meet demand, 140,000 tons in 1905, both from the dry mines and the number 5 shaft, the underground excavations reaching an area of nearly ¼ mile square. The use of number 5 shaft was curtailed around 1911 as it was estimated that the area left unsupported underground had reached its maximum. Brine was left to become saturated in the tunnels leading to the shaft bottom (water would only dissolve a certain percentage of salt per given volume), and the pumps stopped. The situation remained stable until 1920 when brine leaks appeared in the roof of the mine, and it was noticed that the level in number 5 was dropping. This meant trouble on two fronts; the obvious being the possible loss of the mine, and also the removal of the state of equilibrium within the salt saturated redundant workings, because as pure water was drawn from the areas of the number 5 shaft to replace the leakage of brine it would dissolve more salt. In the area immediately [42] above was the softening plant, a reservoir, a road, pipe lines and railway sidings. Something had to be done to remedy the situation and the first thing was to commence pumping to remove the water accumulating in the mine, and try to seal the leaks. Next £3,000 was spent on filling and sealing number 5 shaft and its nearby tunnels. This was done very carefully with clay and concrete. At the time it appeared that all these efforts were successful, but the overall status of the mine would never again be as stable as before, and the seeds of its closure were beginning to grow.

Large though the United Alkali Co. was, within the next 10 years it had been amalgamated with other chemical firms which ultimately became known as I.C.I. the reason for its takeover being its large salt reserves. The irony was that no sooner had it been taken over in 1930, the mine had to be abandoned due to the pillars dissolving, and one night in 1934 a 5 acre area subsided into a reservoir of brine.

The knowledge inherited from the takeover, however, was put to good use at I.C.I.'s developing salt works in Cheshire, and new techniques were devised to extract the salt still available to the South of the old workings by solution mining. In fact, the plastics works of I.C.I. extending for over a mile South of Fleetwood is based on the extraction of chlorine from brine to make poly-vinyl-chloride (PVC).

Surface remains are widespread and obvious, as maps of the area all show, and these include large expanses of water formed after various stages of subsidence, the biggest being approx. 280 yds x 140 yds. A person can walk a zig-zag path round all these mini lakes, from the northern limits of the salt deposits, southwards to where the remains of the main shaft-head buildings are to be seen. (N.G.R. 360467)

These consist of numerous concrete engine beds which are gradually becoming overgrown by brambles. The biggest is the winding engine mounting, just to the east of the two shafts. I.C.I. have capped these two shafts with railway sleepers and erected a wire mesh and barbed wire fence all round. A sign on a door which leads into this enclosure reads: DANGER DEEP SHAFTS AT EITHER END. There are further concrete and steel constructions on the north and south sides of the shafts, and the chutes where the salt was discharged into rail trucks are still visible. Many of the

buildings were situated where the nearest flooded area lies, (see diagram) and the concrete foundations can be seen lying at 45° down the sides of this depression. This is small compared with its neighbour, but is more dramatic as the banks are much steeper and higher – up to 50 feet.

Many brine wells are now to be found southwards, still supplying the chemical works which dominates the far side of the river, with raw salt; a chemical works which has been in operation now for 80 years, and which shows no sign of exhaustion. For as long as I.C.I. can extract the salt without any side effects on the surface, the production of plastics will continue to be one of the biggest employers of manpower in the area, quite a far cry from the hope of finding hematite 100 years ago.

Acknowledgements:- Material for this paper was obtained from an unpublished work in the Lancashire Records Office at Preston, entitled The Salt Industry Of Amounderness by Humphries.
The maps obtained by combining various sources and examination of the surface remains.

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