

Subject: Dicky Doe who worked at WARGM from 1935 to 1976.

[He reads from a text, reads very fast, not always very distinctly and tends to ignore the punctuation. So it was difficult to transcribe accurately].

When I started work in September 1935 as a lab. assistant the lab staff consisted of a foreman, W C Blanchard, Alex Baines, George Smith, Percy Smith, Ted Hitch, R H McClintick, Freddy Dell, Tich Freeman and Jimmy Smith, Les Grindod and myself.

Blanchard retired in 1942 at the age of 65 so was probably there in the 1890s. Alex Baines told me he was a lab boy when Sir Robert Robertson was Chemist-Research. And both the Smiths started as boys in 1910. R H McClintick had just got his IRRC by attending the Regent Street Poly in the evenings, but took his BSC the following year and got a First. He left and joined ECP near Harwich, but returned to the ROFs during the War, and later, in the 1950s I believe was awarded the George Cross for his actions after an explosion in the NG section at ROF Bishopstown where he was the chemist –in-charge.

[A great deal more about who did what job. A reference to a Bert Suckling whose father had been killed in the NG explosion in 1894.]

At the end of my first day's work I was stopped at the main gate by the police and introduced to a small wiry man who said "Is your name Doe"? When I said yes, he said "Do you spell it with an 'e' or a 'w'?" When I answered he said "So do I" It transpired he was a leading fireman and his name was Bill Doe and he was a foundling and knew nothing of his antecedents. His son was Stan Doe who was an electrician's mate and his grand-daughter was Joan Smith whom many people will remember as an PA to SPR1 in the fifties.

The junior staff in the lab. manned the cordite measurement room and the heat test room and quickly became very expert in the use of micrometers and developed good arm muscles grinding all the cordite samples first thing in the morning for heat tests, and? and analysis. The heat test room staff also dried the guncotton samples brought across from Quinton Hill during the day and carried out the heat tests on the guncotton, NG and cordite.

Another unpleasant job was to pick about 10lb samples of cotton waste for woven material, this before the days of Martindale [?] masks so we tied a length of muslin over our nose and mouth to keep the dust out.

The only road on the North Site finished at Walton House so that the road vehicles could deliver to the central stores, but bicycles were allowed to be ridden up the Long Walk to Edmondsey. After dismounting to be searched and before crossing the footbridge into the danger area, everybody, including the Superintendent Doctor Bowden was subjected to this search before a danger area, despite the fact that all contraband was left in cabinets erected in Powdermill Lane outside the main gate.

Walton House housed the superintendents and managers offices and the office staff consisting of Mr Hasler and Charlie French. The one and only messenger, uniformed, was Bill Bailey who was famed for having been a boy soldier with Kitchener at Omdurman.

there were no women in the factory at all. The wages were brought over on Friday afternoon from RSAF on trays, divided into slots about one and a half inches by one inch for each employee. these slots held notes, folded to fit, and a small pile of loose change. Since the minimum adult wage was about 50/- and there were deductions, nobody had a

very large pile to collect. On pay day it was the duty of the foremen to read a portion of the rule book to all assembled so that nobody could plead ignorance of the rules even if they couldn't read.

Deliveries of bulk stores – sodium nitrate, sulphuric acid, coal etc – was mainly by barge on the Lea navigation, and cordite was sent down river to Woolwich by our own sailing barges which were horse-drawn down to Bow and then there they hoisted sail for Woolwich.

Horses were not allowed inside the factory because they had steel horseshoes. So barges were pulled by a team of men. Empty barges rode too high in times of flood to pass under the refinery bridge, so a pile of lead ingots up to 50 tons was kept by the riverside alongside a wooden hand crane which was used to load the lead onto the empty barge to enable it to pass under the bridge. The lead was removed on the other side of the bridge by means of another hand crane.

Explosive barges which went to and from stores, blending and packing houses, also passed under the Refinery Road Bridge and this required a policeman manning the gate to stop the traffic while the boat passed under the road.

The stores section also had boats that used to deliver drums of new materials to storage areas at various places in the plantation. And I remember one character called 'Admiral "Terror" Peck' (?) who was in charge of one of these boats. It was one of our duties to take a sample from each of these drums and I can recall chipping ice from bungholes before the square-ended key could be inserted to undo the bung. And also having glycerine freeze on the sampling pipette which was a glass tube about 1 inch in diameter and about 3ft long.

In hot weather it was not unknown for drums to build up pressure. And one could be sprayed with diamethilanalyn [?], a raw material for tetryl, and a rather nasty-smelling liquid. A stores labourer who regularly helped on these occasions was Rosser Kiff who later became a messenger.

The only piecework job in the factory was unloading barges of sodium nitrate and soda ash and stacking the 200weight sacks in stores alongside the river. This was done entirely by hand. Men carried the sacks on their back from the barge, climbed a short ladder onto the bank, walking along the bank and stacking them in the store up to eaves height.

Samples were often taken while unloading was taking place by sticking the steel sampling spear in 10 per cent of the sacks. As they were carried by.

Early in the War – 1940 – shiploads of Chilean saltpetre were imported and stored in the old refinery buildings and I believe other places in North London. A whole shipload of acetone, some 600 drums, was stored on Lower Island where there was an old sulphur refinery. I set up a lab there and one boy sampled every drum and tested each one for specific gravity, and permanganate tests on the spot. He picked out one single drum of bethylethylketone [????] among the 600.

[He talks of staff recruitment in 1936, 37 and 38.]

All these were from Latimer School in Edmonton. Some older people had been recruited too *[he gives names, including 'Garry Cooper', Fanny Adams etc]* And when War broke out, many more arrived one of whom was named had been an entomologist at the British Museum. He was put to testing tetryl... a test that was known for causing dermatitis.

Lanolin was available in quantity to help combat this. Alan appeared to be immune and was quite content to stay in his job for years on end. He was quite a reserved individual and was famous for wearing pyjama trousers as underpants in the winter.

In March 1939 I was sent to the guncotton lab to join Percy Smith, Bill Roberts having left to join an oil company in Abadan. The road leading up to the gate was bordered on the right by acid factories, sulphuric acid concentrators, nitre pots to make nitric acid from sodium nitrate, and de-nitrating pots for recovering nitric acid from waste acid.

On the left were stores for sodium nitrate and cotton waste. The RDX was being built on the slopes of Quinton Hill on the left and a nitric acid concentrating plant capable of producing water white acid [?] 99 per cent plus was built near the gate on the right.

The GC foreman at that time was Ernie Monk. He wore a bowler hat as a badge of office. The chemist in charge was W H Simmons.

Guncotton was boiled in alkaline water contained in lead-lined wooden vats, no less than seven times for up to 12 hours at a time. The water was changed between each boil. Water for this process was obtained from our own artesian well which also supplied the water for washing the guncotton and for pulping and beating it. Fortunately it never needed dosing to achieve the required alkalinity.

The junior member of the lab staff was confronted each morning with a bench full of samples of the previous day's vat-boilings and soon became proficient at nitrating [????] measured portions of these at lightning speed. On three shift workings these would number something like 700 samples per week. The lab's main job was to provide the

analysis and to calculate the proportions of additions to waste acid to make mixed acid of the correct composition.

There were 9 tanks, each 12ft in diameter and each 12ft high in the tank plant for mixed acid. These had been there for goodness knows how long and had been little used between the Wars. there were holes near the tops of all of them and one had to remember to what height each one could safely be filled.

The base for each filling was about 7 ft of strong[?] acid direct from the displacement process in a nitration house. An addition was made to this with 20 per cent olium [?] imported from Spencer Chapman at Silvertown and nitric acid – 88 per cent, supposedly – made from sodium nitrate, and sulphuric acid from our own factory concentrators.

Nitric acid from the DN pots fired by coke fires filled with wheat waste acid from nitration was also available for use. Unfortunately the nitric acid was never as strong as it should have been because the sulphuric acid was weaker than it should have been owing to the poor performance of the rather ancient volvic stone [?] concentrators.

Although frequent samples were sent to the lab for analysis, I rather fancied that the charge men kept a stock of good samples to send to the lab, and when later during the War a chemist was appointed to keep technical returns he was completely mystified by the discrepancies he found.

Early in the War we managed to cover by myself staying late till 7 or 8 in the evening and Percy Smith who lived near returning during the night to analyse mixed acids for the next day's production. However it soon became apparent that we would have to provide night-

time cover and I began to work a night-shift alternating with Jeremy smith. The factory was working 20 shifts per week. The period from 7am to 3pm on Sunday being the maintenance period.

Since we used one tank of about 200 tonnes of acid per shift, we were striving to have a reserve of three tanks of acid mixed ready for use since stirring made the acid hot and the refrigeration plant could hardly cope. We were very pleased to have achieved this one week, however, we arrived one Sunday morning to find that somebody had opened all the valves on the mixed acid tanks and the tanks had balanced from one to the other. And with waste acid in others, so we had to work like lightning to get one tank ready by 3pm, and this with maintenance staff only on site. Also, to analyse all the acid in all the other tanks and to get additional mixing going in at least two others. Somehow we survived.

It was before we started the night shift and I was leaving around 7pm when we had a terrible accident. A pot had been filled with [?] acid, and the nitric acid had been distilled off and the sulphuric acid at about 70 per cent and hot was being transported to a storage tank by means of air pressure when the charge-man noticed fumes coming from a trap door high up in the brickwork of the coke furnace. He got up on the staging and opened the steel door and the silicone iron pot which must have cracked, split, and he was met with a jet of hot sulphuric acid under pressure. His assistant was immediately below him and completely covered and soon lying in about two tons of hot acid. The chargeman put his arms up to protect his face and managed to get off the staging. Both men were immersed in the baths of hot water kept handy for such emergencies but their clothes were dissolving and their flesh was falling off Peddlers arms. Peddler survived and was out in the Abbey after the War wearing gloves over his hands and with a scarred face. The other man died the next day.

Soon after the War started I was appointed Gas Identification Officer in the Quinton Hill area and was provided with an Army bicycle, a protective coat, a big rattle, some ropes, stakes to mark out the affected area...how I was supposed to carry that lot on the bike I never found out. All I knew was that if I put the coat on I could not possibly mount the bike.

When the War started a company of Pioneer Corps were given the job of protecting the factory and patrolled with fixed bayonets. At night time it was quite unnerving to be challenged by one of these who seemed to lurk in odd corners and jump out on you. I don't know whether they were more scared than we were but I know they were suspected of hiding away for a quiet smoke.

Air raids began in earnest in the summer of 1940 and at first the gates were closed when the sirens were sounded and this resulted in a night shift being locked out. Before long this rule was changed and people had the choice of whether to stay in the air raid shelter or to go home through the raid. One night two men from the cordite section decided to go home had reached the clotting (?) station near Sewarsdon (?) Gate when a bomb fell on a paint store on the Chingford side of Quinton Hill. Pieces of concrete from the foundation of the building hit both of these men and killed them.

On another occasion the RDX section of Quinton Hill was sprayed with incendiaries but fortunately many of them fell on soft ground between buildings and did not ignite. Those that did were all extinguished and no damage was done except to the cotton waste store where the bombs went through the roof and set fire to the bales of cotton which smouldered rather than flamed and our own fire brigade together with the firemen from the town eventually extinguished it.

In late 1939 there was an explosion in the NG section which did a great deal of damage resulting in five deaths as well as numerous other casualties. One NG Hill man was awarded the George Cross for his bravery. Repairs were carried out and production had only just got under way when there was another explosion in the same area again causing deaths and injuries. I was not working on the North Site at this time and have no personal experiences of these incidences. It was because of these accidents that the new NG Hill site was built but happily was never needed to be used.

[In 1940 he became stores inspector at one of the labs]

Despite the fact that all ingredients were inspected by the War Department chemist – later called the Chemical Inspectorate – at source, we still inspected everything that entered the factory, right down to the lasting cloth used to make protective clothing. This was tested by igniting about 100g of Mark 1 cordite about 6 inches underneath a piece of stretched cloth. The cloth was supposed to show no more than a scorch mark on the upper surface.

In 1941 a parachute mine scored a direct hit on a cordite reel store between the gunpowder mills and the factory fence bordering the Waltham Marsh. The main lab lost all of its windows but suffered little other damage. Fortunately all our balances survived intact despite being on the benches facing the blown out windows. The other mine of the pair fell in the watercress beds at the Abbey Farm and was responsible for demolishing all the houses around Romeland [?].

The main output from RGPF in 1935 [1945?] was MD and WM cordite made from guncotton made at Quinton Hill and NG made at Edmondsey. Other products were guncotton slabs and primers used for demolition: tetryl, pycrite, fuse cake, gunpowder, and RD202. Charcoal for both types of powder was made on site from alder buckthorn small stacks of which were kept in the plantation and were favourite places for grass snakes to bask in the sun.

The gun cotton for cordite was transported as damp[?] cylinder-shaped mouldings stacked in aluminium boxes by road to the Grand Magazine at Fishers Green. From there it was taken by boat to the stores where it was dried to about 1 per cent moisture and then to the pouring –on house on the NG section where it was weighed out into rubberised bags in the correct proportion. NG was added to form a paste. This was moved again by boat

to the paste-store and from there by hand truck to the narrow-gauge mills for the incorporating houses where other ingredients such as mineral jelly, carbon..... acetone and water mixtures were added in machines similar to bakers' dough mixers to form a dough.

This dough was transported in leather-covered boxes to the press houses where it was extruded in various diameters up to about a quarter-inch either as solid cord or as tubular cord – according to the weapon it was intended for - and cut to length. the extruded cord was loaded into boats on wooden trays and taken to the south of the factory adjacent to RSAF where it was dried in steam-heated stoves.

From here it went by truck to blending houses where one box from a number of batches were placed around the floor and operatives walked round taking equal samples from each box and depositing it in an empty box at the end. This process was repeated with boxes from a number of blends [batches?] to produce a 'Lot' which was now a fairly homogeneous whole from a large number of incorporator loads.

Tetryl and intermediate explosives used to make gains [?] between detonators and AT fillings was made by treating dyametholanalyn [?] with nitric acid in the Daisy Island area. It coloured the people working there bright yellow and was also a powerful irritant and cause dermatitis to many people.

Pycrite was made by a fusion process from ammonium nitrate and calcium cyanamide again in the Daisy Island area. It was used in the manufacture of flashless cordite which in the late 1930s was in the process of development.

The guncotton section also produced pound slabs and one ounce primers of guncotton used for demolition charges. These were pressed from guncotton straight from the

centrifuges and were quite damp. The slabs were placed in tin boxes and the lid soldered in position. The primers were dried in stoves on racks and were then dipped in acetone which gelatinised the surface. When this had dried they were threaded onto tape and packed into cylinders holding about ten.

In June 1939 the RDX pilot plant came into operation and the water tower upper storey was made into a lab. George Smith had been detached to ARD at Woolwich for a time to learn the necessary tests and he manned this lab together with Jimmy Smith. In September 1939 when War was declared it became our only production plant for RDX and in no time flat we were exporting RDX 'beeswax' and PE1.

A sandbag emplacement was made on the old NG Hill site and we tested the first batches of PE by blowing holes in quarter-inch witness [?] plates with 1 inch diameter right cylinders of PE and electric detonators. We sounded a warning before each shock with a hand blown klaxon.

One of the duties of senior staff was to take X-ray pictures for the factory doctor, who was a local GP, called in when needed. There were two hospitals near to the refinery gate manned by two resident nurses and anyone injured on site was treated there by the doctor and the two nurses. A not infrequent occurrence was somebody falling from a boat into the river. The treatment for this was to spend the rest of the day in bed in hospital, presumably while their clothes were dried.

One extremely important chap was Tucker Archer who emptied and buried the spoils from the earth closets. And who also was able to cultivate a tremendous crop of tomatoes, all self-sown!

Two other important people were the Water Wardens who wore distinctive khaki whipcord uniforms topped by a deer-stalker hat. Their duties were to maintain water levels to enable the water-driven machinery to work and the canals for transport to be kept full, and to prevent flooding. They lived in cottages on site. One was on Lower Island and the other, Waterways Collage, was on the eastern boundary.

Every new consignment of glycerine to be delivered was subjected to a test carried out by Walter Blanchard personally. he took over the large sinks in the main lab for the day while he made a small amount of NG in a glass apparatus, washed it and then subjected it to heat tests. I can't remember that this was called for in the specification for glycerine or that it was carried out at ROF Wrexham.

Olium, at 15 per cent SO₃ and 65 per cent SO₃ was imported from Spencer Chapman, since these were the two strengths at which it was liquid. It was emptied through the bung-hole on the side of[?] gallon drums, weighing some 800lb into a pressure vessel called an acid egg, sunk into the ground, which was then sealed. The acid was then blown by a pipeline to the mixing tanks by means of compressed air.

We never had such a thing as an electric motor [*before the War?*] the only electricity was the lighting....and that was DC. We didn't have any AC until well after the War. We ran propellant plants, and at first the incorporators were the same incorporators used for cordite and we had 30 horsepower DC motors. The powerhouse made its own DC. And at one time they made their own gas. And of course we made our own charcoal.

We used to leave home about 8am and we didn't get back until 10.30 at night. We started work at 8.30 and we went to classes from 6.30 to 9.30.

Plastic propellants started a little bit during the War but was very primitive when I took over in 1945.