

# WALTHAM ABBEY SOUTH SITE ROYAL GUNPOWDER FACTORY

# **BUILDING No. 486**

REPORT No. ESG 2364/97



#### ENVIRONMENTAL SERVICES GROUP REPORT NO. 2364/97

# WALTHAM ABBEY SOUTH SITE ROYAL GUNPOWDER FACTORY

HISTORICAL SURVEY OF BUILDING NO. 486

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Environmental Services Group Royal Ordnance Division British Aerospace Defence Limited Westcott Venture Park Westcott Aylesbury Bucks HP18 ONP

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### REPORT NO. ESG 2364/97

Subject: Historical Survey of Building 486 Waltham Abbey South Site

Client:

**Royal Ordnance Property Services Department** 

ORIGINATOR: ...... S CHADDOCK

G VINCENT CHECKED E G

8. 10.97 DATE 10.12-97

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DR G BULLOCH **AUTHORISED B** 

.8/10/47.....DATE

# Mixing House 486, South Site, Waltham Abbey Royal Gunpowder Factory, Essex

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### Introduction

Following the recent announcement by the Epping Forest District Council to grant planning permission for a development on the South Site the Essex County Council Planning Department's Archaeological Advisory Group has called for a survey of the nitroglycerine mixing house 486. The development proposals for the South Site will probably result in the firing and demolition of this building so this report aims to provide an accurate and permanent record of this historically important structure.

The initial survey report of the South Site at Waltham Abbey with component sheets for each building and a computer generated CAD plot has been completed (Chaddock 1996). The report outlines the history of the site, provides a description of each area and outlines appropriate manufacturing techniques to allow fuller comprehension of the archaeological remains. Those buildings of major importance that did not have a 'documentation pack' have been selected for further recording; they include a part of the Guncotton Factory G431, the Boiler House G403, the Box Store M349, the Guncotton Drying Stove M351 with its attendant Fan House 495, the Cordite Mixing House 486 and the gas-proof Air Raid Shelter SS113. This report provides a more detailed record of the building, complementing the initial survey, and placing the structure in its wider context. A copy of this report, the archive comprising plans and photos will be deposited in the Essex Records Office.

### **Survey Method**

Measured surveys of the buildings were carried out using tapes for both vertical and horizontal measurement throughout. In G403 and G431, where health and safety problems were encountered in gaining access to the full interior height of the roofs, reference was made to surviving architects' drawings in the site archive. Copies of these drawings, converted photographically to metric scales, were used as reference for details, and checked for accuracy wherever possible. Original drawings for M349 and M351 were also referred to and checked, but did not form a significant element of the survey of those buildings.

A Kern GK-O level was used to establish floor levels, etc, in the buildings. Reference to Ordnance Survey datum levels was provided by information from plans of the site supplied by Royal Ordnance (RO).

All plans and sections were drawn in pencil on permatrace. Plans and main sections were drawn at scales of 1:50 or 1:100, depending on the size of the building concerned. Detailed sections were drawn at 1:50, and sections through the passageways in 486 and M351 were recorded at 1:10. A total of 17 drawings were produced, all on A1 or A2 sheets. Following approval by RO and Essex County Council Archaeological Advisory Group (AAG) these were digitised (CAD 12), and A3 copies printed for archiving and the final reports.

A detailed written description of each structure was prepared on proformas prepared in conjunction with the AAG, and is presented in this fashion. Reference was made to the measured surveys for major dimensions: more detailed measurements were made as required with a 5-metre steel tape. The fieldwork notes also contain many sketches of various elements of the buildings. The descriptions were subsequently word-processed, and are presented in hard copy and on disk (Word 6).

The photographic survey was carried out using two Pentax ME 35m SLRs, fitted with 28-70mm zoom lenses. The flash photography was carried out with a professional Metz 60 GT-1 flash, though natural light was used wherever possible. 400ASA film (colour slide and B&W) was used throughout. The photographic registers are presented in hard copy and on disk (Word 6).

The video surveys of 486 and M351 were carried out by a professional cameraman under HAT's direction. Given their similarity, both buildings were recorded in a similar sequence, and structural details, etc, were singled out en route for special attention. Both buildings

were filmed in natural light, with the exception of the NG delivery tunnel in 486, where a portable floodlight was used.

## **History of the Site**

The Royal Gunpowder Factory at Waltham Abbey was a centre of gunpowder production, and latterly chemical-based explosives manufacture, for more that 300 years. There is documentary evidence that gunpowder was being produced at North Site by mid 1660's. The mills were acquired by the government in 1787, and expanded greatly as a result of the demand for powder generated by the Napoleonic wars. After a period of retrenchment for the 1820's, the RGPF returned to prominence in the second half of the 19<sup>th</sup> century, playing a leading role in technical innovation, meeting demand for cannon powders for guns of ever increasing size, and manufacturing moulded powders in large quantities (RCHME 1993). From the 1890s into the early twentieth century the site was a leader in the development of manufacturing technologies for the new chemical propellants and explosives that were extensively utilised in the First and Second World Wars.

The building 486, which was originally constructed in 1890, formed part of the early Cordite Factory on the South Site. The building was originally used to store nitroglycerine for the manufacture of Cordite Mk 1 in a purpose built factory nearby on Quinton Hill. In 1894 it was destroyed and rebuilt as a cordite Mixing House No.2.

## The history of Chemical Explosives in the late 19<sup>th</sup> Century.

Although experiments with nitroglycerine had been carried out from the middle of the 19<sup>th</sup> Century demand rose in Europe from the late 1860s on, after Nobel had discovered a safe method of transporting it with kieselguhr and dynamite.

Following the patenting of cordite in 1890, Colonel Noble, RGPF Superintendent, travelled to Germany to inspect the NG plant at the Rheinsiche Dynamit Fabrik, part of the Nobel Group, at Opalgen near Köln. He returned with recommendations that the German Factory be used as a template for the new Waltham Abbey factory, including the purchase of appropriate plant from Germany. At home, Mr. McRoberts of the Nobel factory at Ardeer, where NG had been manufactured since 1873, advised on certain modifications that could be made, including the injection of the glycerine into the mixed acids. The plant that came into operation at Waltham Abbey by March 1891 was a compromise between the Oplagen plant and McRoberts' suggestions.

The NG factory was built on Quinton Hill on the principle that the chemicals could flow through the processing plant largely under the force of gravity. From the Charge House at the top of the hill the process flow for the nitroglycerine ended in one of the nitroglycerine stores (Plate 1). From here the early cordite workers would have come to collect a charge of nitroglecrine for incorporation with the dry guncotton.

In the afternoon of Monday 7th May 1894, an explosion in the Washing House severely damaged the fabric of the factory, halved production, and killed four men in the process. The **Washing House** (N544) and **NG Store** (486) were completely demolished, and most other buildings in the area extremely damaged, including Nitrating House No.2, where a nitration was in progress.

Soon after the explosion 486 was rebuilt circular in plan (Plate 2) and its use was changed to that of a Mixing House. The change to Mixing House can be explained in terms of safety regulations developed out of the Sandhurst Report into the explosion (Lord Sandhurst Committee 1894). The report forbade government establishments to store pure nitroglycerine but to mix it directly with the guncotton. As Plate 2 shows the intention was to rebuild a store, but the new regulations meant that this building was reused as a mixing house.

#### Nitroglycerine Manufacture at Waltham Abbey RGPF

The manufacture of nitroglycerine and the developments made at Waltham Abbey can be found in Chaddock 1996, section 10.2.

# **Description of the Mixing House 486**

### Building no: 486 Mixing house NGR: TQ 3832 9952

#### 1. General

A circular timber-framed inner room (external diameter 7.9m) with a conical roof, constructed within a brick revetment wall and earth traverse (Plate 3). Access via a curving entrance tunnel to the south (Plate 4) : a second smaller NG delivery tunnel, now blocked, enters the building from the north (Plate 5). The inner room has a double door in line with the access tunnel, and 24 windows, in pairs, set high in its walls. Between the inner room and the revetment wall is an encircling inner passage. Where the access tunnel meets the inner passage there is a roofed 'shoe room'. A roofed timber bridge links the NG delivery tunnel and inner room (Plate 6).

*Inner Room:* Frame consisting of 80 x 115mm timber uprights at c.750mm centres. Between these are an unknown number of runs of horizontal members 80 x 70mm section, fixed by mortise and tenon joints. At the base, the uprights are fastened to a timber sole plate, 150 x 50mm section, set in a lip in the concrete floor.

The inner wall surface is lined with vertical tongue and groove planking, planks 120 x 16mm, fastened with soft non-ferrous nails. This is covered with zinc sheeting, fastened with non-ferrous tacks (Plate 7).

The outer wall surface is covered throughout with horizontal weatherboarding, planks 225mm wide, fastened with iron nails.

The top of the inner room wall is braced to the revetment wall by horizontal beams,  $120 \times 100$  mm section, their outer ends set into the brickwork, the inner ends probably jointed to the wall frame uprights (no details of this visible) (Plate 8).

All external woodwork is painted grey, over a white primer.

#### 2. Services

Electricity: For lighting only. See Sections 8 & 11.

*Water:* A lagged 50mm diameter iron pipe enters the inner passage c.3m west of the delivery tunnel at a height of c.3.5m, descends vertically and follows the traverse wall anticlockwise towards the access tunnel at a height of c.2m, descending to a large brass tap with a threaded nozzle outside the west door of the shoe room (Plate 9). The pipe is lagged with asbestos, within a wooden box.

There is some evidence that this pipe may originally have entered 486 via the NG delivery tunnel. A row of iron hooks along the west wall of the latter (Section 3, below) and a hole through the west wall of the delivery tunnel bridge are at a similar height to the existing pipe run around the traverse wall.

*Drainage:* Rainwater runoff from the inner room roof appears to have fallen directly into the inner passage: there is no evidence for gutter or downpipes. The inner passage floor level continues as a gully beneath the shoe room floor: presumably there is a drain at some point around the inner passage, but the debris present obscures this (Plate 10).

#### 3. Passageways & Traverses

*Traverse:* An earth traverse originally *c*.40m diameter and up to 6.5m high, subsequently truncated on its east and west sides by the construction of nitro-glycerine gutters, the former in a substantial cutting with concrete revetment walls.

*Revetment Wall:* The wall encircling the inner room is constructed of buff brick, laid in English bond. From observations of the junctions between the revetment wall and tunnels, the wall appears to be 3 feet (915mm) thick. Its internal diameter is 9.75m. Around the base of the wall, about 200mm above the inner passage floor, clay pipes run through the wall to drain off excess groundwater from the mound. The brickwork of the tunnels butts onto the outer face of the revetment wall. The access tunnel is of a slightly smaller section to the corresponding hole in the revetment wall, and projecting brickwork at this point has been chamfered to remove sharp edges. The revetment wall is capped with a concrete blast ring, ext. diameter. 12m, its inner face sloping downwards towards the inner enclosure. About half way down this face is cast a shallow concentric rainwater gully, with drains through the blast ring to the north-west and north. At intervals of c.1.5m around the top of the blast ring are small rectangular holes ( $c.10 \times 30mm$ ), possibly for a metal safety fence, though none show any sign of having held iron stanchions of the type their size suggests.

*Inner Passage:* Passage 0.9m wide between inner room and revetment wall. Not roofed, with the exception of a 4.5m length extending either side of the access tunnel, forming the shoe room area. This is separated from the rest of the passage by doorways to the left and right, both of which held doors. The passage floor, which was obscured by debris, is at least 200mm below that of the inner room, shoe room and access tunnel (Plate 11). The passage floor level continues as a gully beneath the boarded shoe room floor.

Access Tunnel: 11.5 m long, 2.3m high and 1.58m wide. Exits revetment wall on south side, curving to the west. Constructed in buff bricks: walls laid in English bond, roof in stretcher bond. Its outer entrance consists of an arch below a simple brick parapet, set between two parallel wing walls which slope down, following the mound's contour, to end in simple brick piers (Plates 4, 12 and 13). Tunnel walls and roof are of 10" (254mm) brickwork, sloping down at 4° towards the inner room.

*Delivery Tunnel:* At least 9m long, 1.7m high and 750mm wide. Straight, but approaches access point in revetment wall skewed westwards at an angle of  $c.18^{\circ}$ . Its outer end is filled with building debris, mostly concrete blocks, so details of the entrance are not available. Constructed of buff bricks, butted to revetment wall.

The delivery tunnel is joined to the inner room by a roofed timber bridge (Plate 6). The west side of the structure is weatherboarded, with a hole part way up its north end for a pipe, c.75mm diameter. The east side is partly weatherboarded, below a 4-light window. The roof is ridged, with a timber framework covered with boarding, clad externally in zinc sheet.

Along the west side of the tunnel are iron hooks, c.1.0m above the passage floor and at 3.15m spacing. Below them, set in the wall at c.600mm intervals, is a row of timbers of 100 x 100mm section, cut off flush with the wall. These presumably supported the lead gully which carried the nitro-glycerine into the building (Plate 5). Of this no trace remains, though a timber support with a semicircular cut-out for the gully survives at the south end of the bridge. The access from the bridge to the inner room is blanked off. This evidently took place before the interior of the inner room was clad with zinc sheet.

#### 4. Door & Window Details

*Entrance Door:* Single door, outward opening, 2220 x 1500 x 50mm, vertical boarded, flush exterior. Screwed to large pintle hinges (hinge bar length 920mm), hung on pintles set into the brickwork of the tunnel mouth (Plate 4). Lower hinge further forward than upper, making door swing closed against iron stop set in right-hand wall (Plate 14). Socket for large bolt also in right-hand wall. Hook for fastening door open of west wall. Only top rail of door survives.

*Inner Room Doors:* Double doors, outward opening,  $2010 \times 650 \times 50$ mm each.  $2 \times 100$ mm brass butterfly hinges on each door (Plate 15). Other fittings include: bolts at top and bottom (inner or north side only), a padlock hasp and ring, a wooden turnbuckle and thin leather loops fastened by non-ferrous brackets on the outer (south) side, and a brass pull handle on both sides. The door frame has been largely removed, so details of its construction, etc., could not be ascertained (Plate 11).

Shoe Room Doors: Outward opening doors to inner passage on east and west sides of shoe room (Plate 9). Doors each 2020 x 750mm, solid panel in lower 1/3 rd, 4 glassed lights in upper part. Each door fitted with 2 x 100mm brass hinges, and a 150mm brass bolt.

*Inner Room Windows:* 24 2-light windows, set in pairs evenly around the room at a height of 2.58m (Plate 16). Overall dimension of a single window is 580 x 460mm. Many of those not connected with the lighting system for the room (see Section 8) have traces of blackout paint on the glass (Plate 7). Frames are painted white. All the windows appear to be non-opening.

*Viewing Window:* To the east of the inner room doors is a small inspection window, 235 x 190mm (Plate 15). Glazed with a single pane, set almost flush with the inner face of the room. Hinged wooden door on  $2 \times 50$ mm brass hinges fitted with a small cabinet lock covers the window on the shoe room side (Plate 17).

#### 5. Signs & Instruction Boards

Over the entrance to the inner room is screwed a small blue enamel plate bearing the number '8' in white (Plate 15).

#### 6. Roof

Timber frame, rafters 120 x 50mm section, at a 14° pitch. Details of the roof's construction are obscured by a lining of zinc sheet covering its interior (Plate 16), but from the little that can be seen it appears similar in construction to the roof in the adjoining NG Washing House (N544). That building has a series of radial rafters, linked by two concentric rings of purlins. At their outer ends the rafters are bracketed to the internal face of the inner room wall. At the internal apex of the roof is a zinc disc, covering the circular base for the ventilation chimney, now replaced by a low zinc cap. The exterior surface of the roof is boarded radially and clad externally with preformed interlocking segments of zinc sheet. Non-ferrous nails are used throughout.

Externally, the roof apex is braced by two substantial timbers, running from the capped central vent to the revetment wall to the north-west and south-east approximately. Both timbers are well weathered, and appear to be later additions.

The shoe room roof is supported on timbers spanning the outer passage, and consists of planking covered with zinc sheeting.

#### 7. Interior Fixtures & Fittings

None.

#### 8. Lighting

*Electricity Supply:* Enters via a conduit fastened to the roof of the access tunnel (Plate 13). Beyond the tunnel mouth, no trace of its route remains. As with other buildings, the switch box and fuses for this building were almost certainly externally located, but have not survived.

*Tunnel Lighting:* The access tunnel was lit at two points, one just inside the entrance door, the other at the shoe room end. Each fitting consists of an iron plate 250mm diameter, bolted to the conduit. The underside of the plate is painted white, and there are points around its edge for clamping a protective glass globe. In the centre of the plate is screwed a brass bayonet bulb socket. Neither fitting remains in its original location (Plate 18).

*Inner Room Lighting:* The conduit in the corridor continues through the shoe room roof and runs around the inner passage, fastened to metal brackets set in the revetment wall *c*.400mm below the top of the brickwork. From this conduit 4 'Maxlume' light units branch off, located against the inner room windows to the north-east, north-west, south-east and south-west. Each light unit consists of a sheet metal case,  $360 \times 275$ mm, with a flat glass front, containing a single bulb (Plate 8). Access into the units is via a hinged door at the rear, with a sliding catch. Only one remains in its exact original position.

#### 9. Heating

None.

#### 10. Buildings Close by with Obvious Relationship to this Building

NG Washing House (N544) and the remains of its associated Junction House.

#### 11. Communications

No evidence of telephone lines, etc., connected with this building.

#### 12. Floor

The floor in the access passage is surfaced with a hard fine dense grey material (usually gritless asphalt), presumably laid over concrete (as in other buildings). The shoe room floor consists of removable boarded sections, overlying the gully formed by the continuation of the concrete inner passage floor (Plate 10). The floor in the inner room is of fine concrete: its original covering, probably lead, has been removed.

#### 13. Additional Observations

*Phasing:* Two distinct phases are apparent. The first, the NG Mixing House as built, is represented by a functional NG delivery passage and an unlined inner room. Subsequently the NG delivery trough was removed and the passage was blanked off at its inner end and filled with rubble at its outer end (the rubble filling *could* post-date the changes to the inner room). The interior walls and ceiling of the inner room were lined with zinc sheeting, covering the former delivery trough access point, and the roof ventilator was removed. The extra bracing to the roof apex is also a later addition. The water supply to the building, originally routed through the delivery tunnel, was replaced by a pipe passing through the revetment wall to join the original pipes inside.

The blackout paint on the windows could be of either WW1 or WW2 date.

#### Discussion

The building 486 represents the historical wealth on the Waltham Abbey site. It dates originally from the earliest nitroglcerine factory for the manufacture of Cordite and was part of the early Cordite Mark 1 facility (Plate 1). It was demolished in the 1894 explosion and rebuilt soon afterwards on an improved design (Plate 2). It served as a mixing house in the cordite process until 27<sup>th</sup> August 1903 when the plant on the North Site began producing large enough quantities to cope with the Cordite MD operations. It opened again temporarily in the summer and autumn of 1904 while the North Site nitroglycerine plant was being modified.

The relining of the interior must be seen as a modification after the removal of some of the other process buildings in 1907-8 (PRO SUPPLY 5/710). With its position sunk deep into the protection of the earth mound, 486 could have been used for storage of explosives or propellants. Its proximity to RDX Hill would suggest that the RDX section made some use of it but there is little evidence for this. The presence of blackout paint may suggest some activity that required light in one of the wars or it may be the result of a general instruction to black out all windows.

## Acknowledgments

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Appendices

Appendices

# **Appendix 1: Photographic Register**

# Photographic Register

WALTHAM ABBEY RGPF SOUTH SITE	Date: August 1997	Initials: RJZ
Building: 486 Mixing House	Film: 400ASA Colour	Slide &
	Monochrome	

Shot No.	Description	Scale	Neg. No.
B/W+Col			B/W
1	Entrance to access passage, from south	2m	0
2	Entrance to access passage, from south	2m	1
3	Inner face of traverse wall, showing brackets for ?lighting	-	2
	conduit and bracing for walls of inner room		
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24	Inspection window, from shoe room	-	24
25	Junction between brickwork of traverse wall and access tunnel	-	25
26	Boarded floor of shoe room, and drainage gully beneath	-	26
27	Light fitting from passage, no longer in situ	-	27
28	Door stop and latch socket, east wall of access tunnel	2m	28

**Appendix 2: Archive Contents** 

#### **Archive Contents**

Survey plot of the Mixing House at 1:100 Surveyed section of the Mixing House, tunnels and traverse at 1:100 Surveyed section of the Mixing House at 1:50 Section through the access tunnel at 1:10 Section through the delivery tunnel at 1:10 Survey data on zipped disc using CAD12 Bound copy of typescript report One set of monochrome prints from 35mm film One set of Colour slides (35mm) 3 ½" floppy disc with text and photographic registers VHS video footage of the Mixing House

# Appendix 3: Essex Sites and Monuments Record Summary Sheet

### **Appendix 3: Essex Sites and Monuments Record**

#### Site name/Address: Mixing House 486, South Site, Waltham Abbey Royal Gunpowder Factory, Essex District: Parish: Waltham Abbey **Epping Forest** NGR: Site Code: TQ 3832 9952 **WASS 97** Site Director/Group: Type of Work: Steve Chaddock / Prince Research Building record/survey Consultants Date of Work: Size of Area Investigated: 01.07.97 - 31.08.97 Location of Finds/Curating Museum: **Funding Source:** Essex Records Office Environmental Services Group, Royal Ordnance plc Further Seasons anticipated?: **Related SMR Nos:** NO, as site is due to be developed and this is last stage of recording. Final Report: Periods Represented: 1891 to ?1950 SUMMARY OF FIELDWORK RESULTS: A recording brief, carried out on the Mixing House of the Quinton Hill Nitroglycerine Factory, included a survey of the building in plan and sections through the nitrglycerine delivery and foot access tunnels. and photographic and video coverage. The Quinton Hill plant was installed in 1891 as a compromise between the Oplagen plant in Germany and the Ardeer plant in Scotland. Its main purpose was to serve the cordite Mk 1 facility situated immediately to the south. The Mixing House was originally a Nitroglycerine Store and after an explosion in 1894 was rebuilt to an improved design as a mixing house, a change in safety procedure. The mixing house has been reused as a zinc lined explosives store after it went out of use with the rest of the Quinton Hill plant c.1908. It is reasonably well preserved and with the Washing House close by forms an important survival on the historic Waltham Abbey site. The Mixing House consists of a free standing, circular, timber building, surrounded by an earthwork traverse, revetted on the inside with a brick wall. The traverse is pierced by a brick-vaulted entrance tunnel and a smaller delivery tunnel. Nitroglycerine entered the Mixing House through the delivery tunnel in a lead lined wooden gutter of which there is now no trace. Previous Summaries/Reports: 1996 ECC FAG Nitroglycerine Washing House Report by Stuart Foreman 1996-7 Archaeological Evaluation of South Site by S. Chaddock including Site Survey in CAD Environment, Component Sheets for all buildings and text report detailing remains and processes carried out on site. Author of Summary: Date of Summary: S. Chaddock 04/09/1997

#### **Summary Sheet**

**Appendix 4: The Plates** 



BRITISH AEROSPACE

PLATE 1 REPORT No. Int 3-97/2364





486 PLATE 3 - EXTERIOR OF ROOF OF INNER ROOM, FROM SOUTH EAST

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486 PLATE 4 - DOORWAY OF ACCESS TUNNEL, SHOWING SURVIVING DOOR FITTINGS



486 PLATE 5 - INTERIOR OF NITROGLYCERENE DELIVERY TUNNEL



486 PLATE 6 - INNER PASSAGE: EAST SIDE OF NG TUNNEL BRIDGE STRUCTURE



486 PLATE 7 - INNER ROOM, PAIR OF WINDOWS (NOTE BLACKOUT PAINT)



486 PLATE 8 - INNER PASSAGE: WINDOW WITH MAXLUME FITTING IN-SITU, AND BRACING BEAM OVER



# 486 PLATE 9 - DOORWAY FROM WEST SIDE OF SHOE ROOM TO INNER PASSAGE



486 PLATE 10 - BOARDED FLOOR OF SHOE ROOM, AND DRAIN GULLY BENEATH



# 486 PLATE 11 - SHOE ROOM, WEST SIDE



### 486 PLATE 12 - ENTRANCE TO ACCESS PASSAGE FROM SOUTH



486 PLATE 13 - INTERIOR OF ACCESS PASSAGE, FROM SOUTH

# INTENTIONALLY BLANK



## 486 PLATE 14 - DOOR STOP AND LATCH SOCKET, EAST WALL OF ACCESS TUNNEL ENTRANCE



486 PLATE 15 - SHOE ROOM, DETAIL OF DOOR, ROOF, NUMBER OVER DOOR AND INSPECTION WINDOW



486 PLATE 16 - INNER ROOM, INTERIOR FROM NORTH





486 PLATE 18 - LIGHT FITTING FROM PASSAGE (NO LONGER IN-SITU)

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**Appendix 5: The Figures** 



PLAN OF THE CORDITE FACTORY AT WALTHAM ABBEY, COMPRISING THE NITRO-GLYCERINE AND GUN COTTON FACTORIES.











DOVAL		MDE

# **ROYAL GUNPOWDER MILLS** WALTHAM ABBEY SOUTH SITE

Drawing prepared by: Hertfordshire Archaeological Trust The Seed Warehouse, Maidenhead Yard, The Wash, Hertford. SG14 1PX.

**BUILDING No. 486** N.G. MIXING HOUSE

Section B-B1

SCALE: 1:50

DWG No:486/3



Drawn By:KH,DR

DATE: 24.07.97



BRITISH AEROSPACE		
Royal Ordnance		
ROYAL GUNPOWDER MILLS		
WALTHAM ABBEY		
SOUTH SITE		
Drawing prepared by: Hertfordshire Archaeological Trust The Seed Warehouse, Maidenhead Yard, The Wash, Hertford. SG14 1PX.		
BUILDING No. 486		
N.G. MIXING HOUSE		
Access Tunnel Section C-C1		
SCALE: 1:10	Drawn By:KH,DR	
DWG No:486/4	DATE: 24.07.97	



BRITISH AEROSPACE		
ROYAL GUNPOWDER MILLS WALTHAM ABBEY SOUTH SITE		
Drawing prepared by: Hertfordshire Archaeological Trust The Seed Warehouse, Maidenhead Yard, The Wash, Hertford. SG14 1PX.		
BUILDING No. 486 N.G. MIXING HOUSE		
Delivery Tunnel Section D-D1		
SCALE: 1:10	Drawn By:KH,DR	
DWG No:486/5	DATE: 24.07.97	